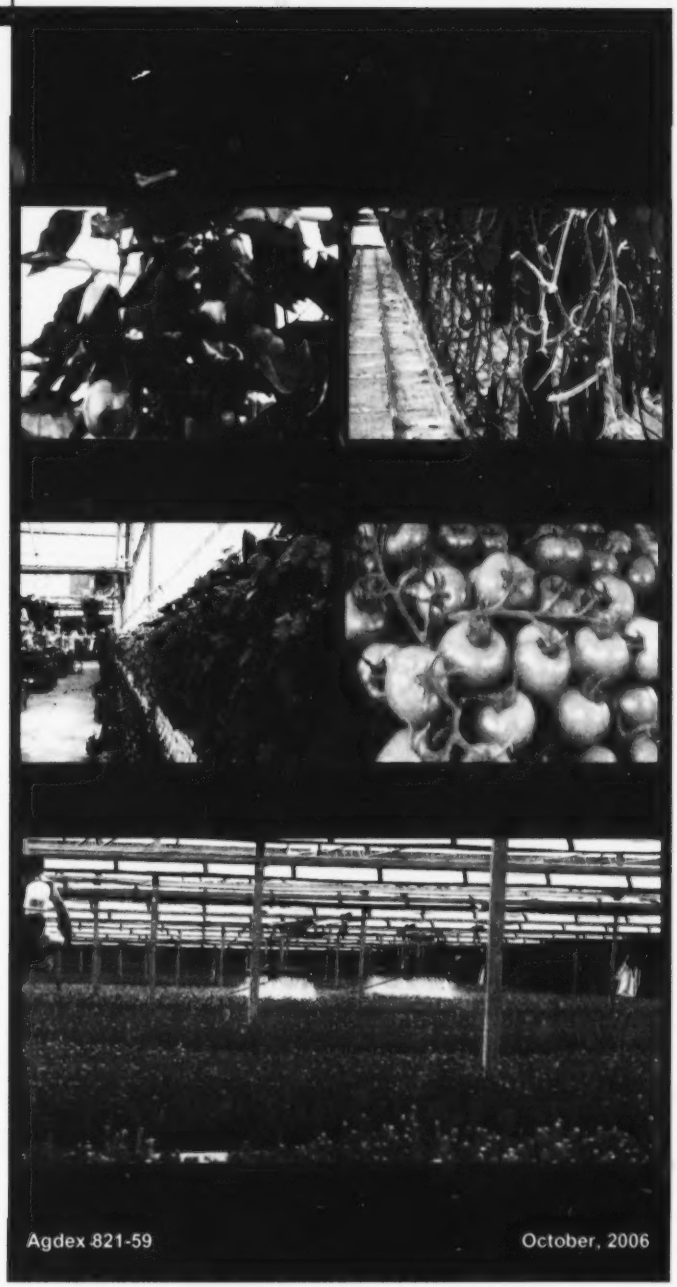
The Economics of Production and Marketing of Greenhouse Crops in Alberta



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The Economics of Production and Marketing of Greenhouse Crops in Alberta

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TABLE OF CONTENTS

PAGE

ACKNOWLEDGEMENT i

SECTION I

Introduction 1

Objectives of the Study 2

The Study Sample 2

Method of Analysis 3

SECTION II

Greenhouse Operations in Alberta 4

An Overview of the Greenhouse Industry in Alberta and Canada 4

Survey of the Greenhouse Industry 6

Greenhouse Crops 7

Greenhouse Crops Area by Regions 9

Marketing of Greenhouse Crops 10

Physical Characteristics of Greenhouses 10

SECTION III

Greenhouse Production Costs and Returns 13

Computation of Individual Cost Components 13

SECTION IV

Greenhouse Production Costs and Returns for Cucumbers 16

Investment for Cucumber Producing Greenhouses in Medicine Hat/Redcliff 16

Greenhouse Production Costs and Returns for Cucumbers in Medicine Hat/Redcliff 16

Investment for Greenhouses Producing Cucumbers in North-Central Alberta 20

Greenhouse Production Costs and Returns for Cucumber in North-Central Alberta 22

SECTION V

Greenhouse Production Costs and Returns for Tomatoes 25
Investment for Greenhouses Producing Tomatoes in Medicine Hat/Redcliff 25
Greenhouse Production Costs and Returns for Tomatoes in Medicine Hat/Redcliff 25
Investment for Greenhouses Producing Tomatoes in North-Central Alberta 29
Greenhouse Production Costs and Returns for Tomatoes in North-Central Alberta 29

SECTION VI

Greenhouse Production Costs and Returns for Peppers 34
Investment for Greenhouses Producing Peppers 34
Greenhouse Production Costs and Returns for Peppers 34

SECTION VII

Greenhouse Production Costs and Returns for Bedding Plants/Ornamentals 39
Investment for Greenhouses Producing Bedding Plants/Ornamentals 39
Greenhouse Production Costs and Returns for Bedding Plants/Ornamentals 41

SECTION VIII

Greenhouse Production Costs and Returns for Cut Flowers 44
Investment for Greenhouses Producing Cut Flowers 44
Greenhouse Production Costs and Returns for Cut Flowers 44

SECTION IX

Greenhouse Production Costs and Returns for Tree Seedlings 48
Investment for Tree Seedling Greenhouses 48
Greenhouse Production Costs and Returns for Tree Seedlings 48

SECTION X

Summary of Costs and Returns.....53

LIST OF TABLES

Table		Page
1	Greenhouse Area in Alberta and Canada, 1981-2005 (Hectares)	4
2	Greenhouse Area in Alberta and Canada, 1981-2005 (Million Square Meters)	4
3	Number of Greenhouse Operations by Size in Alberta by Regions, 2005	7
4	Distribution of Greenhouse Area by Crops	8
5	Greenhouse Vegetables, Floriculture and Tree Seedlings Production Area by Regions	9
6	Type of Heating Systems Used in Greenhouses	11
7	Natural Gas Prices, 1998-2005	12
8	Average Investment for Cucumber Producing Greenhouses, 2005 (Medicine Hat/Redcliff)	17
9	Production Costs and Returns for Cucumber Producing Greenhouses, 2005 (Medicine Hat/Redcliff)	18
10	Average Investment for Cucumber Producing Greenhouses, 2005 (North-Central Alberta)	21
11	Production Costs and Returns for Cucumber Producing Greenhouses, 2005 (North-Central Alberta)	23
12	Average Investment for Tomato Producing Greenhouses, 2005 (Medicine Hat/Redcliff)	26
13	Production Costs and Returns for Tomato Producing Greenhouses, 2005 (Medicine Hat/Redcliff)	27
14	Average Investment for Tomato Producing Greenhouses, 2005 (North-Central Alberta)	30
15	Production Costs and Returns for Tomato Producing Greenhouses, 2005 (North-Central Alberta)	32
16	Average Investment for Pepper Producing Greenhouses, 2005 (North-Central Alberta)	35
17	Production Costs and Returns for Pepper Producing Greenhouses, 2005 (North-Central Alberta)	36
18	Average Investment for Bedding Plant/Ornamental Greenhouses, 2005 (Alberta)	40
19	Production Costs and Returns for Bedding Plant/Ornamental Greenhouses, 2005 (Alberta)	42
20	Average Investment for Cut Flower Producing Greenhouses, 2005 (Alberta)	45

21 Production Costs and Returns for Cut Flower Producing Greenhouses, 2005 (Alberta) 46

22 Average Investment for Tree Seedling Producing Greenhouses, 2005 (Alberta) 49

23 Production Costs and Returns for Tree Seedling Producing Greenhouses, 2005 (Alberta) 50

24 Summary of Greenhouse Production Costs and Returns by Crops, 2005 54

LIST OF FIGURES

Figure		Page
1	Location of Greenhouses in Alberta	5
2	Greenhouse Vegetables, Floriculture and Tree Seedlings in Alberta	9
3	Breakdown of Greenhouse Cucumber Production Costs, 2005 (Medicine Hat/Redcliff)	20
4	Breakdown of Greenhouse Cucumber Production Costs, 2005 (North-Central Alberta)	24
5	Breakdown of Greenhouse Tomato Production Costs, 2005 (Medicine Hat/Redcliff)	29
6	Breakdown of Greenhouse Tomato Production Costs, 2005 (North-Central Alberta)	33
7	Breakdown of Greenhouse Pepper Production Costs, 2005	38
8	Breakdown of Greenhouse Bedding Plants/Ornamental Production Costs, 2005	43
9	Breakdown of Greenhouse Cut Flower Production Costs, 2005	47
10	Breakdown of Greenhouse Tree Seedlings Production Costs, 2005	52

Appendix

Summary of Greenhouse Production Costs and Returns by Crops, 2000 55

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SECTION I

Introduction

The origin of the Alberta Greenhouse Crops Industry goes back almost one hundred years. It was in 1905 when Dutch and German settlers began plant production under protection cultivation. Since 1970, Alberta Agriculture, Food and Rural (AAFRD) has committed material resources to the development and growth of this industry in Alberta.

The greenhouse industry in Alberta has gone through several adjustments, therefore, the need was felt to develop costs and returns based on current conditions so the industry can change accordingly. Because of changing economic conditions, previously compiled information on the greenhouse industry in the late nineties had become more or less obsolete. The cost of natural gas, electricity and other greenhouse supplies became major concerns during the fall of 2000 and continues from these one. This study based on actual costs and returns from forty three (43) greenhouse operators across the province, provides more current data on costs and returns for major greenhouse crops.

Significant increases in the price of electricity and greenhouse supplies created some serious economic difficulties for greenhouse operators in the province. Realizing these difficulties, the provincial government announced energy assistance programs for the greenhouse industry as well.[1]

Major greenhouse crops grown include vegetables, bedding plants, potted flowers and ornamentals, cut flowers, herbs, perennials and tree seedlings. More recently, particularly over the last decade, a number of greenhouse operations have switched to producing tree seedlings under contract for the forestry industry. During the last decade, the greenhouse industry in Alberta has grown rapidly. This growth in the greenhouse industry has been prompted by consumer demand for fresh and quality produce. Alberta advantage in terms of lower taxes and input costs have also contributed to this growth. However, recent rapid increases of natural gas and electricity prices have somewhat dampened further expansion prospects for this industry in the short run.

The greenhouse industry in Canada represents the fastest growing sub-sector in horticulture with over $2 billion in sales. In 2001, area under glass and plastic in Canada was 17.8 million square meters (1 781 hectares). Despite high energy costs it increased by about four percent to over 18.5 million square meters (1 851 hectares), in 2002. In 2005, greenhouse area in Canada was estimated at just under 19.9 million square meters (1 989 hectares).

The size of Alberta's greenhouse industry, under both glass and plastic, was about 557 620 square meters (56 hectares) in 1990. In 2005, the area under cover in Alberta has increased to over 1.21 million square meters (121 hectares), an increase of over 116 percent

[1] Alberta government announced a one-time gas rebate of $0.40 per square foot during 2000 and 2001. Another natural gas rebate program was announced in the fall of 2003. This program is in place through March 31, 2009.

during the last fifteen years. Alberta greenhouse industry is ranked fourth in the country when compared to the other provinces. Ontario continues to lead the greenhouse industry with 10.4 million square meters (1 044 hectares) area, followed by British Columbia at 4.9 million square meters (493 hectares) and Quebec at 2.4 million square meters (235 hectares). In percentage terms, Ontario accounts for 52 percent of all greenhouse area in Canada, with British Columbia at 24 percent and Quebec at 13 percent. Alberta accounts for about six (6) percent of the greenhouse area in Canada.

Approximately 99 percent of the greenhouse area in Alberta is under commercial production, with the balance confined to institutions such as universities, research stations and colleges. Most of the Alberta's greenhouse operations are highly diversified and are equipped with most modern equipment to achieve production efficiencies. The gross revenue generated by the greenhouse industry in 2005 was estimated at around $150 million, with an investment or total value of assets of about $255 million.

This report provides the most current information on greenhouse production costs and returns for the major greenhouse crops (bedding plants/ornamentals, cut flowers, cucumbers, peppers, tomatoes and tree seedlings).

Objectives of the Study

The major objectives of the study were:

1) Determination of the structure of the greenhouse industry in Alberta.
2) Estimation of greenhouse production costs and returns by major crops.
3) Identification of the main factors influencing production and marketing of greenhouse crops in Alberta.
4) Identification of major problems experienced by greenhouse producers in Alberta.

The Study Sample

A questionnaire specifically designed for greenhouse operations was used to obtain the required information from a selected sample of greenhouse operators across the province. Forty three (43) greenhouse operators were interviewed to obtain production costs and returns information on bedding plants/ornamentals, cut flowers, cucumbers, peppers, tomatoes and tree seedlings for the 2005 crop. Vegetable producing greenhouses (cucumbers, peppers and tomatoes) were divided into two groups, i.e. Medicine Hat/Redcliff and North-Central to compare natural gas and other costs between the two groups. In case of peppers there were only two (2) producers from Medicine Hat/Redcliff group; therefore their information is not included in the report for data confidentiality purpose.

Method of Analysis

After completion of the questionnaire, raw data were reviewed to make sure that no information was missing before entering it for analytical purposes. In the past, we used a mainframe computer program "SPSS" (Statistical Package for the Social Sciences) to analyze both the individual farm reports as well as computing group averages. However, for the 2005 crop, a Paradox 9 program (micro-computer database) was used to analyze the greenhouse data. This program is very versatile and allows changes and updates in many of the cost allocations.

Each greenhouse operation was analyzed separately. The study sample was divided by crop groups. In order to preserve confidentiality of the data obtained, no group averages were developed for greenhouse crops with less than four participants.

SECTION II

Greenhouse Operations in Alberta

Although greenhouses in Alberta are scattered throughout the province, almost two-thirds of these operations are located in the south and south-central regions. The area around Medicine Hat and Redcliff is called the "greenhouse capital of the Prairies. This area is well known for the Red Hat Co-op (a producer organization responsible for marketing of greenhouse vegetables) and the large number of greenhouses there. Most greenhouse operations are located in cities and towns because of easy access to labour, marketing facilities, utilities and the services necessary for a greenhouse operation. Because of very high land prices and taxes, during the last several years a few new greenhouses have been built at a distance from major population centers. Distribution of greenhouses in Alberta is shown in Figure 1.

An Overview of the Greenhouse Industry in Alberta and Canada

Data in Tables 1 and 2 provide an historical overview of the growth of the greenhouse industry in Alberta and Canada from 1981 to 2005. During the twenty years, i.e. 1981 to 2001 greenhouse area in Alberta increased by almost 169 percent. On an annual basis it increased by about 8.5 percent. Since 2001, greenhouse area in Alberta has increased by about 16.3 percent to 121 hectares in 2005. Fastest growth in greenhouse area occurred between 1996 and 2001 both in Alberta and at the national level. Greenhouse area in Alberta increased by 41 percent during these five years and almost by 40 percent at the national level.

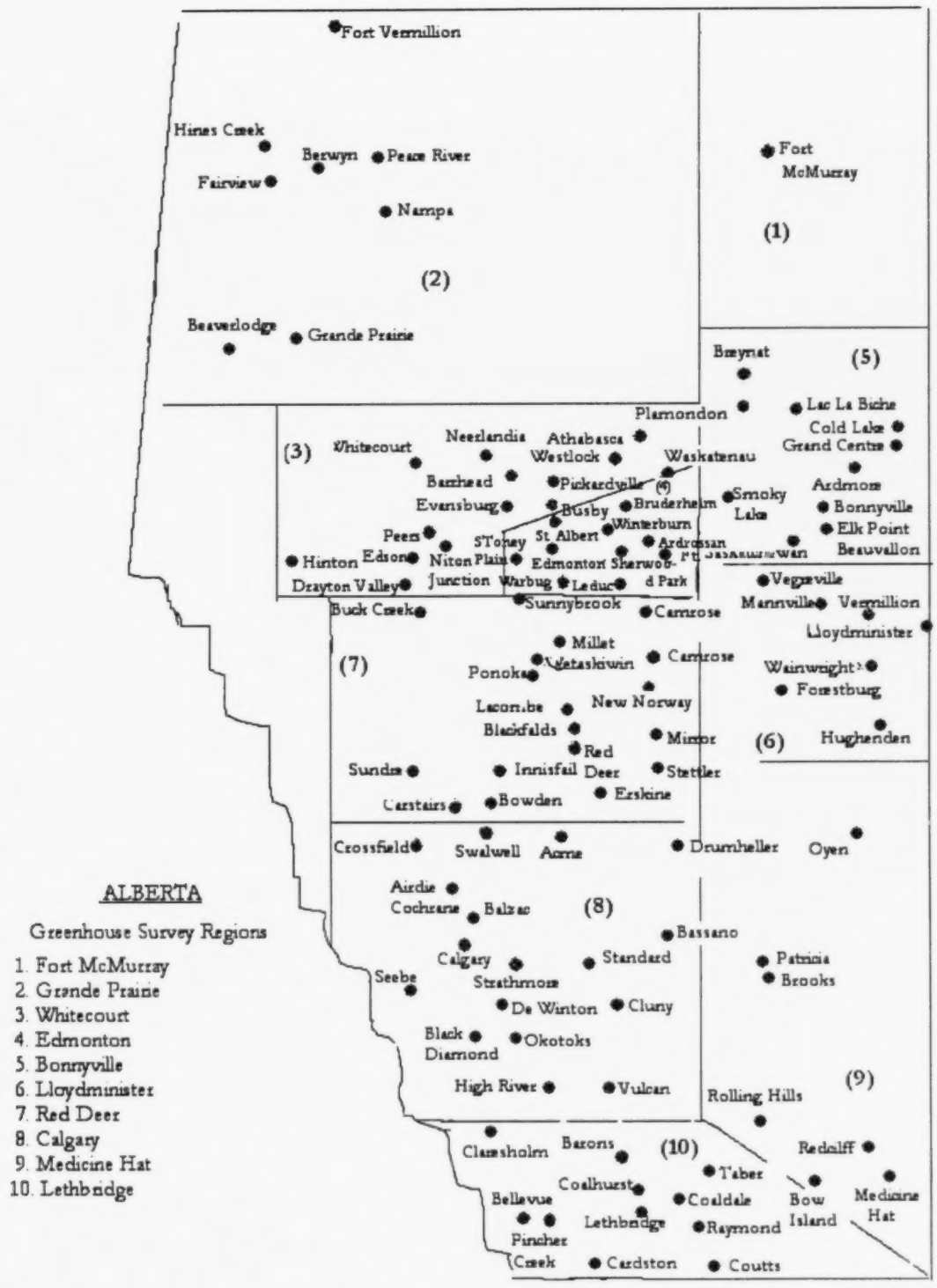
Table 1

Greenhouse Area in Alberta and Canada, 1981-2005 (Hectares)							
	1981	**1986**	**1991**	**1996**	**2001**	**2003**	**2005**
Alberta	39	52	53	74	104	115	121
Canada	665	719	844	1 274	1 781	1 879	1 989
Percent Alberta	5.8	7.2	6.3	5.8	5.9	6.1	6.1

Table 2

Greenhouse Area in Alberta and Canada, 1981-2005 (Million Square Meters)							
	1981	**1986**	**1991**	**1996**	**2001**	**2003**	**2005**
Alberta Area	0.389	0.519	0.534	0.74	1.046	1.149	1.205
Canada Area	6.65	7.19	8.44	12.75	17.8	18.51	19.89
Percent Alberta	5.8	7.2	6.3	5.8	5.9	6.1	6.1

Figure 1. **Location of Greenhouses in Alberta**



Survey of the Greenhouse Industry

According to a survey[2] of the greenhouse industry completed in 2001, there were approximately 386 commercial greenhouse operations in Alberta with a total area of 1 096 464 square meters or 271 acres (110 hectares). Since 1986, the greenhouse industry in Alberta has increased by 95 percent. In 2005, area under cover in Alberta was estimated at 1.21 million square meters or 121 hectares.

This comprehensive survey, undertaken by the Alberta Agriculture, Food and Rural Development Department in cooperation with Alberta Greenhouse Growers Association (AGGA) provided detailed information on the size and structure of the greenhouse industry in the province. An earlier survey done for the greenhouse industry reported on the types of crops grown in greenhouses, heating systems, types of greenhouse material, marketing of greenhouse produce, (wholesale and retail operations) and greenhouse operators' concerns, etc.

The three regions with the largest greenhouse area in the province are Medicine Hat (32 percent), Red Deer (16 percent) and Edmonton (15 percent). The remaining 29 percent of greenhouse area is scattered throughout the province, from Peace River in the north to Lethbridge in the south. Table 1 provides information on the size of the greenhouse industry in the province. Table 2 classifies greenhouse operations by area (size of greenhouse operation).

Table 3 lists the number of greenhouse operations surveyed in each city and major town. The province was divided into these areas to obtain a better understanding of the location and size of greenhouse operations.

[2] Abdusalam Asif Maan, "Profile of the Greenhouse Industry in Alberta", Alberta Agriculture, Food & rural Development, Edmonton, Alberta, 2001.

Table 3

Number of Greenhouse Operations by Size in Alberta by Regions, 2005						
Region	**Industry Area (m^2)**	**Size of Operation (Sq. M.)**				**Number of Greenhouses by Region**
		< 1 000	**1 000 to 2 000**	**2 001 to 4 000**	**>4 000**	
Fort McMurray	3 870	3	2	0	0	5
Grande Prairie	38 592	23	3	1	4	31
Whitecourt	26 965	26	8	4	0	38
Edmonton	181 654	25	19	20	8	72
Bonnyville	91 894	7	5	2	3	17
Lloydminster	26 480	18	5	3	1	27
Red Deer	218 982	27	16	9	10	62
Calgary	154 955	15	12	12	6	45
Medicine Hat	416 964	4	2	19	38	63
Lethbridge	44 691	14	5	6	1	26
TOTAL OPERATIONS	**1 205 047**	**162**	**77**	**76**	**71**	**386**
Percent of Operations	-	**42**	**20**	**20**	**18**	**100**

Data in Table 3 show that 42 percent (162) of greenhouse operations are less than 1 000 square meter. Twenty percent each of the operations are between 1 000 to 2 000 and 2 000 to 4 000 square meter, respectively. About 18 percent (71) of greenhouse operations in Alberta are in the over 4 000 square meter group.

Statistics Canada also conducts a survey of the greenhouse industry every year to identify the number of commercial operations in the province, crops grown and the total output of crops produced in a controlled environment. In 1988, although all greenhouse operations in Alberta were contacted by Statistics Canada, only 76 firms reported on their operations. The area reported by these firms was 331 691 square meter, which was about half of the area reported in the 1986 census. In 1984, the number of firms reporting on their operations was 109. Greenhouse area reported by these firms was estimated at 256 041million square meter. In 1985, the number of firms returning Statistics Canada questionnaires decreased to 106 and so the overall area reported by these firms.

Greenhouse Crops

Greenhouses in Alberta produce many kinds of flowers; chrysanthemums, roses and geraniums being the most common potted plants. Outdoor flowers such as petunias and marigolds are also produced in these greenhouses. Some greenhouse operations concentrate

on importing tropical plants, which are acclimatized to Alberta conditions before resale. The most commonly grown greenhouse vegetables are cucumbers, tomatoes, peppers and lettuce. During the last few years' attempts have been made to grow eggplants, cauliflower, cabbage, herbs and Chinese vegetables, as well as other crops.

Table 4 lists the types of crops grown in greenhouses across the province. The only greenhouses growing a single crop are ones producing vegetables and a few of these also grow bedding plants. A considerable number of greenhouses produce more than one crop.

Greenhouses surveyed for the 2005 crop year were selected to obtain production costs and returns data for all major greenhouse crops including tree seedlings for the forestry industry. Greenhouses producing a variety of crops were in operation year round, whereas the vegetable greenhouses were in operation for about ten months, February through November. Those producing bedding plants were in operation for about five months, February to June.

Table 4

Distribution of Greenhouse Area by Crops			
Greenhouse Crops	**No. of Growers**	**Area (m^2)**	**% of Area by Crops**
Vegetables			
Cucumbers	78	244 897	19
Tomatoes	69	101 094	8
Peppers	28	54 185	4
Lettuce	9	11 119	1
Egg Plant	2	186	
Other Crops	6	8 681	1
Sub-Total	**192***	**420 162**	**35**
Floriculture			
Bedding Plants	265	324 819	25
Potted Flowers & Ornamentals	53	78 315	6
Cut Flowers	26	57 199	4
Herbs	40	20 135	2
Perennials	170	127 619	10
Sub-Total	**554***	**608 088**	**50**
Tree Seedlings	**27**	**176 797**	**15**
TOTAL	**774***	**1 205 047**	**100**

*Growers producing multiple crops. Actual number of growers surveyed for crops grown was 386.

Greenhouse Crops Area by Regions

Table 5 provides information on the crop size of the greenhouse industry in the province by regions. The largest greenhouse area, with 608 088 square meters (50 percent) was reported under floriculture, followed by 420 162 square meters (35 percent) under vegetables and 176 797 square meters (15 percent) under tree seedlings. The Medicine Hat region which includes Redcliff reported 71 percent of the greenhouse area under vegetables. Three largest floriculture production centers are Edmonton, Red Deer and Calgary. Bonnyville and Medicine Hat are the leading tree seedling production regions in the province.

Table 5

Greenhouse Vegetables, Floriculture and Tree Seedlings Production Area by Regions				
Region	**Greenhouse Crops Area By Regions (Sq. M.)**			
	Vegetables	**Floriculture**	**Tree Seedlings**	**Total Area by Region**
Fort McMurray	0	3 870	0	3 870
Grande Prairie	933	34 420	3 5990	38 952
Whitecourt	6 830	20 135	0	26 965
Edmonton	2 310	170 979	8 365	181 654
Bonnyville	550	9 899	81 445	91 894
Lloydminster	5 018	21 462	0	26 480
Red Deer	69 258	141 490	8 144	218 892
Calgary	19 488	135 467	0	154 955
Medicine Hat	298 490	42 960	75 244	416 964
Lethbridge	17 285	27 406	0	44 691
Total Area	**420 162**	**608 088**	**176 797**	**1 205 047**
Percent of Total	**35**	**50**	**15**	**100**

Note: Conversion rate: Square Meter = 10.76 sq. ft.

Figure 2. Greenhouse Vegetables, Floriculture and Tree Seedlings in Alberta

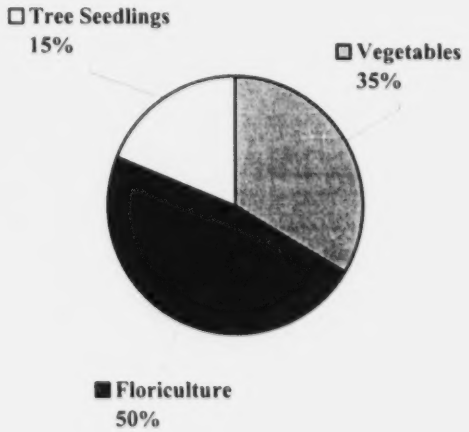


Figure 2 is based on the data presented in Table 5. The floriculture has the biggest size, 50 percent in the province, followed by 35 percent vegetables and 15 percent tree seedlings.

Marketing of Greenhouse Crops

Greenhouse operators use several channels to market their produce. The most important of these were retail facilities owned by greenhouse operators, either attached to the greenhouses or located in an urban area; other retail and wholesale facilities; the Co-op at Redcliff; Pick-N-Pack Co-op at Lacombe and farmers' markets in various centers. The Red Hat Co-op at Redcliff serves as the focal point for the marketing of long english cucumbers grown in and around Medicine Hat and Redcliff. Cucumber producers in north-central Alberta market their produce through Pick-N-Pack (a cooperative of growers in Lacombe). Greenhouse operators pay a commission or fee set by the Board of Directors of the Co-ops to cover grading, packaging, storage, marketing and administration costs.

In north-central Alberta, greenhouses producing vegetables and bedding plants sell a large percentage of their produce at the gate and through rented stalls/booths in shopping centers and farmers' markets. Farmers' markets have become popular marketing outlets, especially during the bedding plant season.

Physical Characteristics of Greenhouses

Greenhouses in Alberta range from small sash roof "lean-to" houses constructed of a wood-frame sash, to large modern steel frame houses with truss supported roofs. Most new greenhouses are made of steel, wood or masonry covered with either glass, fiberglass, double plastic or a single layer of plastic. A survey by the Alberta greenhouse industry in 2003 reported over one million square meters of greenhouse area in Alberta. The number of greenhouse operations surveyed was 386. During the last decade the greenhouse industry in Alberta has more than doubled. New greenhouse operations are equipped with most modern and efficient crop production tools.

The major internal features of greenhouse systems in Alberta are as follows:

Heating Systems:

A year round greenhouse operation is heated, using natural gas, steam, propane or coal to maintain optimum temperatures for crops grown during the winter months. Some vegetable producing greenhouses operate ten months of the year and close down during December and January. Greenhouses producing cut flowers operate year around and thus have high heating requirements. Natural gas burners heat almost all of the greenhouses in southern Alberta and when combined with stovepipes these burners provide sufficient heating through natural air movement. Greenhouses in northern Alberta are equipped with natural gas boilers and hot water pipes for heating. All boiler-heating systems have automatic temperature control devices.

In addition to heating systems, most greenhouses in Alberta are equipped with a pad and fan cooling system. The cooling system is essential if temperatures are to be lowered during the hot summer months.

Table 6 presents the various types of heating systems used in greenhouse operations in the province. In some cases a grower has more than one heating system. During the last four to six years, almost a dozen greenhouse operations have either completely switched over to using coal or added coal fired furnaces to reduce natural gas costs.

Table 6

Type of Heating Systems Used in Greenhouses		
Responses	**Systems**	**Percent of Responses**
274	Natural Gas Furnace	85
102	Hot Water	31
48	Steam	15
31	In-floor heating	10
16	Propane Furnace	5
8	Soil Heating	2
7	Electric	2
5	Stove Pipe Heater	1
13	Coal Deckker	4
2	Bio-therm	1

N=324

Watering Systems:

The watering of ground beds is usually done by the use of soaker hoses, which run parallel to each side of the bed. Bench beds and potted plants are usually watered with the use of chapin tubes. Other operations may use water supply pipes along with garden hoses.

Supplementary Lighting:

Very few greenhouses have supplementary lighting. Those that do, make use of ordinary lamps, or High Pressure Sodium (HPS) lights in winter to increase flower production and thus adjust the supply and demand balance usually five to six feet apart. Supplementary lighting is mostly used for producing chrysanthemums and roses.

Data for natural gas prices in Table 6 were obtained under the Alberta Input Monitoring Systems (AIMS). Each month data on several farm input prices are collected from twenty five stations across the province. These prices do not include service and delivery charges for natural gas. In 1999, the natural gas price increased by 25 percent over 1998 and it further increased by another 25 percent in 2000. Natural gas price increase in 2001 was by about 62 percent from a year earlier. However, the overall increase in 2001 was almost 153 percent from 1998. In 2002, natural gas price decreased significantly. But in 2003, it went back up to $7.00 per GJ, an increase of over 56 percent. In 2004, natural gas price showed a marginal decrease but increased to a record level in 2005. Thus putting a serious economic constraint on businesses relying heavily on natural gas. Natural gas industry analysts predict that it is expected to remain somewhat volatile during the next several years.

Table 7

Natural Gas Prices, 1998-2005	
Year	**$ per GJ**
1998	2.91
1999	3.63
2000	4.54
2001	7.35
2002	4.48
2003	7.00
2004	6.95
2005	8.22

Source: Alberta Farm Input Prices, Statistics and Date Development Unit, AAFRD, Edmonton.

SECTION III

Greenhouse Production Costs and Returns

Computation of Individual Cost Components

Interest on Investment:

Interest is defined as a sum paid or calculated for the use of capital. The sum is usually expressed in terms of a rate or percentage of the capital involved, called the interest rate.

Interest is charged for the use of investment capital. Had the capital not been invested to buy a specific asset, it could have been used elsewhere, either within or outside the firm and would have brought some additional return to the firm. However, for the purposes of this study, actual paid capital interest was used to arrive at capital costs.

Depreciation:

Depreciation is defined as the loss in value of an asset over time, mainly as a result of obsolescence. In the case of buildings and equipment, it is that portion of the decrease in value resulting from the passage of time. Obviously, part of the reduced value of the buildings and equipment is the result of usage and is considered a variable cost. The entire depreciation is considered a fixed cost.

In computing depreciation, a 10 percent allowance or salvage value is taken from the purchase price of the buildings and equipment. The following formula was used in arriving at depreciation for buildings and equipment.

$$\text{Depreciation} = \frac{\text{Purchase Price} - \text{Salvage Value}}{\text{Number of Years of Life}}$$

Land Value:

Land associated with each greenhouse operation was valued at $5,500 per acre, irrespective of its location. This value was determined through real estate values for good farmland suitable for a greenhouse operation. It can be argued that allocation of such a value distorts cost of land in and around urban areas relative to farmland. However, for uniformity and reasonable cost estimates, it was decided to standardize the land value regardless of its location. Researchers are aware that land values in cities or towns are much higher than $5,500 per acre, but if market values were used for land acquired ten years ago, it would lead to artificially much higher fixed costs that would greatly inflate overall production costs. Most of the greenhouse operators surveyed have been in business for quite some time, with the exception of a few who got started within the last eight years or so.

Property and Business Taxes:

Taxes on real estate include payments made on the assessed value of the greenhouse operation less any assessment for the greenhouse operator's residence or operations other than the greenhouse. There is a business tax on greenhouses located in urban municipalities. Exact amounts of property and business taxes were included in the costs.

Labour Costs:

Hired labour costs included the amount of wages and any benefits received by the hired workers, such as contributions to Workers' Compensation, Canada Pension Plan, and Unemployment Insurance.

The hours spent by the operator and his/her families in greenhouse production were estimated. An operator's labour was valued at $10.50 per hour and family labour was valued at either the rate paid to hired labour or the actual amount paid to family members.

Production Materials and Supplies:

Production materials and supplies included the purchase of cuttings, seed plants, fertilizers, chemicals, soils, vermiculite, perlite, peat moss, straw, peat pots and plastic. Costs of production materials and supplies were the actual figures provided by the study participants.

Heating Costs:

Almost all greenhouse operators had reasonably accurate costs for heating the greenhouses with natural gas. Monthly bills were helpful in arriving at the total heating costs. A sudden increase in natural gas costs during the fall of 2000 and continuing into the following years prompted major concerns for economic viability of the greenhouse industry at that time.

Utility Costs:

Utility costs included electricity, telephone and water. Where the utility bill was combined with the greenhouse operator's residence, the operator was asked to apportion the bill to arrive at total utility costs for the greenhouse operation.

Transportation Expenses:

Expenses for trucks or other vehicles owned by greenhouse operators were apportioned according to their use in the greenhouse operation, personal and leisure driving. Freight charges paid to commercial or private carriers for hauling greenhouse produce or supplies were included in the transportation expenses.

Repairs and Maintenance Costs:

Maintenance costs included repairs to greenhouse structures, boilers, heating equipment, tractors and all other machinery and equipment associated with the greenhouse operation.

Marketing Charges:

Marketing charges were the actual amount paid by each greenhouse operator for having produce marketed through the Redcliff and Edmonton Co-ops. These charges covered grading, packaging, marketing and administrative fees. The charges paid by each grower were included as a cost item in the study.

Miscellaneous Costs:

These costs include legal and accounting fees, office supplies, bad debts, donations, membership fees, insurance costs and other costs incurred in a greenhouse operation, but not reported under any other heading.

SECTION IV

Greenhouse Production Costs and Returns for Cucumbers

In 2005, cucumber production represented about 22 percent of the greenhouse area in Alberta. Long English cucumbers are the second largest crop produced in a controlled environment after bedding plants. Almost 75 percent of greenhouse cucumber production is in the "Greenhouse Capital of the Prairies" - the Medicine Hat and Redcliff area.

Production costs and returns presented in Tables 8 to 11 are based on data obtained from ten greenhouse cucumber producers across the province (southern and central Alberta). Six of the greenhouse operations surveyed in 2005 producing cucumbers were from the Medicine Hat and Redcliff area and four from central Alberta. Due to the differential in natural gas costs between Medicine Hat/Redcliff area and central Alberta, cucumber producing greenhouses surveyed were divided into two respective groups

Production costs include operating costs, investment costs, depreciation (buildings, equipment and automotives) and operator's labour. For any enterprise or operation to be economically viable, it must recover operating costs.

Investment for Cucumber Producing Greenhouses in Medicine Hat/Redcliff

The average greenhouse area for the six (6) cucumber producing greenhouses was 6 970 square meter for the 2005 crop year. It was significantly higher than the industry average of 2 898 square meter (31,179 square feet). Land area associated with cucumber producing greenhouses was estimated at just under seven acres. Value of land associated with these greenhouses was calculated to be $39,167 or $5.62 per square meter of greenhouse area.

The average investment in greenhouse buildings for cucumber producing greenhouses amounted to $363,583 per greenhouse ($52.16 per square meter). Average investment in machinery and equipment was reported at $297,200 per greenhouse ($42.64 per square meter). When land, buildings, machinery and equipment investments were combined, total investment was estimated at $699,950 per greenhouse. In terms of dollars per square meter it was $100.42. Details on land, building, machinery and equipment investment and depreciation are given in Table 8.

Greenhouse Production Costs and Returns for Cucumbers in Medicine Hat/Redcliff

Gross Return:

Gross return (A) represents sales of cucumbers through the co-ops and other market outlets. Gross revenue for an average greenhouse with production area of 6 753 square meter was estimated at $585,511 or $86.70 per square meter (Table 9). When crop insurance

Table 8 **Medicine Hat or Redcliff**

Average Investment for Cucumber Producing Greenhouses, 2005

Greenhouse Area: 6,970 sq.m.

INVESTMENT SUMMARY:	**Total $**	**$/sq. m.**
Land	39,166.67	5.62
Buildings	363,583.33	52.16
Machinery & Equipment	297,200.00	42.64
TOTAL INVESTMENT	**699,950.00**	**100.42**

INVESTMENT DETAIL:	**Enterprise Value ($)**	**Age (Years)**	**Depreciation ($)**
Land -Building Site:	**39,166.67**		
Greenhouse Buildings:	**363,583.33**	**10.5**	**12,725.42**
Equipment:			
Refrigeration / Freezer Storage	333.33	1.7	16.67
Warehouses / Storage Sheds	15,000.00	4.7	750.00
Fuel Tanks	0.00	0.0	0.00
Houses(25%)	48,125.00	26.0	2,406.25
Other Buildings	0.00	0.0	0.00
Lighting	0.00	0.0	0.00
Heating System	116,366.67	10.5	5,818.33
Ventilation System	8,083.33	4.2	404.17
Humidity Control	18,083.33	7.5	904.17
Benches	0.00	0.0	0.00
Irrigation System	15,333.33	6.3	1,533.33
Water Pumps / Sand Filters	6,700.00	6.5	670.00
Soil Mixers / Flat Fillers /Seedling Lines	0.00	0.0	0.00
Generators	14,166.67	12.0	1,416.67
Roto-Tillers	0.00	0.0	0.00
Storage / Mixing Tanks	2,683.33	4.8	268.33
Sterilizers	0.00	0.0	0.00
Sprayers	6,900.00	6.0	690.00
Carts / Dolleys	4,366.67	10.0	436.67
Fertilizer Injectors	2,866.67	5.0	286.67
Small Tools / Hardware	3,250.00	8.2	325.00
Sub-Total	**262,258.33**		**15,926.25**
Machinery & Vehicles			
Bobcats / Forklifts	6,166.67	3.2	616.67
Trucks	28,775.00	13.2	2,877.50
Other Machinery	0.00	0.0	0.00
Sub-Total	**34,941.67**		**3,494.17**

Table 9 **Medicine Hat or Redcliff**

Production Costs and Returns for Cucumber Producing Greenhouses, 2005

Production Area: 6,753 sq.m.

Number of producers: 6

				Total $	$/sq. m.
(A)					
	1. Crop Sales - Imputed Value of Production			585,511.17	86.70
	2. Crop Insurance Receipts			0.00	0.00
	3. Miscellaneous Receipts			10,188.00	1.51
	GROSS RETURN			**595,699.17**	**88.21**
(B)					
	1. Growing Media, Seed/Cuttings			67,437.33	9.99
	2. Fertilizer & Chemicals			30,463.50	4.51
	3. Greenhouse Insurance			11,145.00	1.65
	4. Trays, Boxes & Other Packaging			3,055.00	.45
	5. Freight and /or Trucking Costs			334.67	.05
	6. Auto Fuel, Repairs, Licenses & Auto Ins.			13,415.83	1.99
	7. Repairs - Buildings and Equipments			9,450.00	1.40
	8. Utilities: Natural Gas	.64 GJ		108,513.33	16.07
	9. Electricity	0.00 KW		17,210.00	2.55
	10. Water	0.00 M^3		8,523.50	1.26
	11. Phone			1,592.00	.24
	12. Custom Work & Specialized Labour			645.50	.10
	13. Marketing Costs			102,939.17	15.24
	14. Assoc. Dues, Prof'l Fees & Promotion			6,745.83	1.00
	15. Small Tools, Supplies & Misc. Expenses			5,521.00	.82
	16. Operating Interest Paid			1,250.00	.19
	17. Labour Insurance / Benefits			5,098.67	.75
	18. Hired Labour	10179.00	hours	112,016.75	16.59
	19. Unpaid Labour	470.00	hours	5,170.00	.77
	VARIABLE COSTS			**510,527.08**	**75.60**
(C)					
	1. Property / Business taxes			11,664.00	1.73
	2. Equipment & Building	a) Depreciation		32,145.83	4.76
		b) Lease Payments		0.00	0.00
	3. Paid Capital Interest			30,072.67	4.45
	TOTAL CAPITAL COSTS			**73,882.50**	**10.94**
(D)	**CASH COSTS**	**(B+C-B19-C2a)**		**547,093.75**	**81.01**
(E)	**TOTAL PRODUCTION COSTS**	**(B+C)**		**584,409.58**	**86.54**
(F)	**GROSS MARGIN**	**(A-D)**		**48,605.42**	**7.20**
	RETURN TO UNPAID LABOUR	**(A-E+B19)**		**16,459.58**	**2.44**
	RETURN TO INVESTMENT	**(A-E+C2a)**	6.2 %	**43,435.42**	**6.43**
	RETURN TO EQUITY	**(A-E)**		**11,289.58**	**1.67**

receipts were included to cucumber sales, total gross revenue for greenhouse cucumber production increased to $595,699 or $88.21 per square meter.

Variable Costs:

Variable costs (B) include all out-of-pocket costs and unpaid labour, which amounted to $510,527 per greenhouse with average production area of 6 753 square meter (72,662 square feet). In terms of variable costs per square meter, these were estimated at $75.60 for producing cucumbers in greenhouses in the Medicine Hat/Redcliff area. Because of the producers' interest in knowing their variable costs for each basic unit of production, these costs were broken into as much detail as possible. The most significant cost items were marketing costs, natural gas costs, followed by hired labour, unpaid labour expenses, seed, fertilizer and chemical costs.

Capital Costs:

Capital costs (C) were comprised of property/business taxes, equipment and building depreciation, lease payments and actual capital interest paid. Average total capital cost for this group of greenhouse operators amounted to $73,882 per greenhouse or $10.94 per square meter for greenhouse cucumber production in 2005.

Cash Costs:

Cash costs (D) include all out-of-pocket costs except unpaid labour and equipment and building depreciation. These costs amounted to $547,094 per average greenhouse (6 753 square meter) or $81.01 per square meter.

Total Production Costs:

Average total production costs for cucumber producing greenhouses in Medicine Hat/Redcliff were estimated at $584,410. These costs were $86.54 per square meter. Details on the total production costs for greenhouse cucumber production are presented in Table 9. Figure 3 shows the relative proportion of all costs for greenhouse cucumber production for the 2005 crop year.

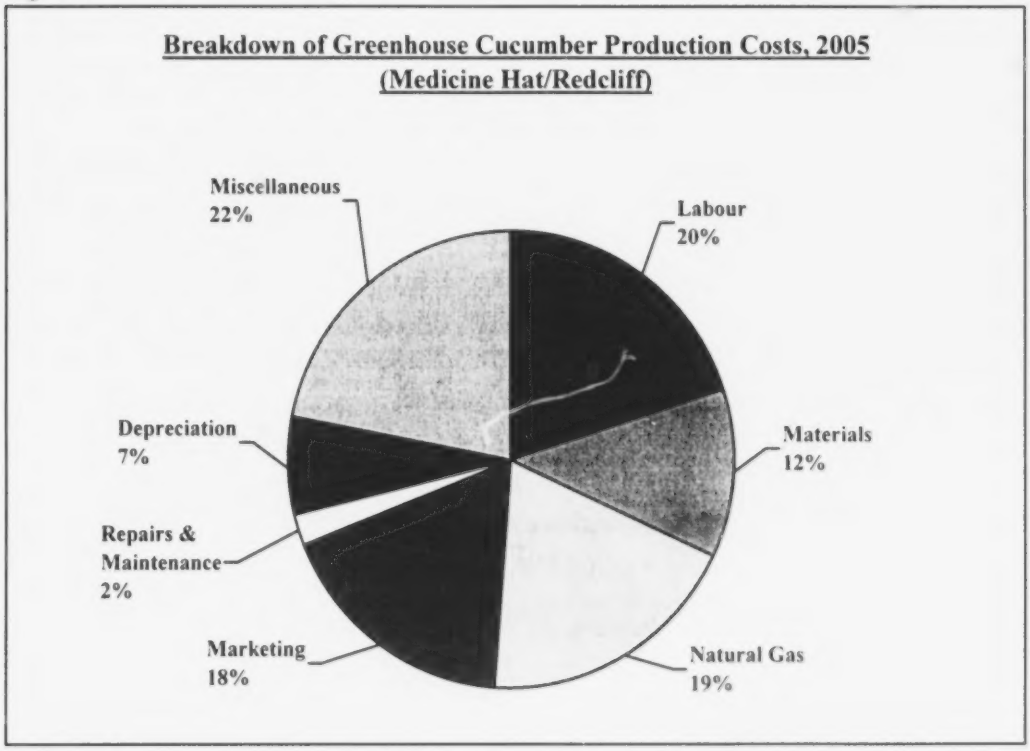
Management Indicators:

Gross Margin - when cash costs (D) were deducted from gross return (A-D), average greenhouse cucumber producer showed a positive gross margin of $48,605 ($7.20 per square meter). A positive gross margin indicates that the enterprise is economically feasible.

Average return to unpaid labour amounted to $16,460 per greenhouse producing cucumbers. In terms of per square meter it was $2.44.

Average return to investment was positive at $43,435 per greenhouse ($6.43 per square meter). Similarly, average return to equity was also positive at $11,290 per greenhouse or $1.67 per square meter).

Figure 3



Investment for Greenhouses Producing Cucumbers in North-Central Alberta

Greenhouse investment data for cucumber production was obtained from four greenhouse operations in central Alberta. Average size of greenhouse area for cucumber producing greenhouses was 4 480 square meter. Average land area associated with these greenhouses was about three acres valued at $53,157 or $10.91 per square foot.

Average buildings investment for these greenhouses was reported at $237,370 or $48.71 per square meter. Machinery and equipment investment for these greenhouses amounted to $541,552 per greenhouse or $111.12 per square meter. A detailed breakdown of land, buildings, machinery and equipment investment are presented in Table 10. Total investment for cucumber producing greenhouses was estimated at $832,097 or $170.74 per square meter.

Table 10 North-Central Alberta

Average Investment for Cucumber Producing Greenhouses, 2005

Greenhouse Area: 4,874 sq.m.

INVESTMENT SUMMARY:	Total $	$/sq. m.
Land	53,175.00	10.91
Buildings	237,370.00	48.71
Machinery & Equipment	541,552.00	111.12
TOTAL INVESTMENT	**832,097.00**	**170.74**

INVESTMENT DETAIL:	Enterprise Value ($)	Age (Years)	Depreciation ($)
Land -Building Site:	**53,175.00**		
Greenhouse Buildings:	**237,370.00**	**11.0**	**8,307.95**
Equipment:			
Refrigeration / Freezer Storage	0.00	0.0	0.00
Warehouses / Storage Sheds	26,835.00	10.0	1,341.75
Fuel Tanks	985.75	11.8	49.29
Houses(25%)	47,031.25	20.8	2,351.56
Other Buildings	0.00	0.0	0.00
Lighting	0.00	0.0	0.00
Heating System	318,370.00	6.5	15,918.50
Ventilation System	15,000.00	4.8	750.00
Humidity Control	14,625.00	9.0	731.25
Benches	0.00	0.0	0.00
Irrigation System	18,812.50	5.1	1,881.25
Water Pumps / Sand Filters	3,200.00	2.5	320.00
Soil Mixers / Flat Fillers /Seedling Lines	0.00	0.0	0.00
Generators	12,225.00	13.0	1,222.50
Roto-Tillers	0.00	0.0	0.00
Storage / Mixing Tanks	13,700.00	9.8	1,370.00
Sterilizers	0.00	0.0	0.00
Sprayers	3,331.25	3.3	333.13
Carts / Dolleys	12,157.50	11.3	1,215.75
Fertilizer Injectors	7,271.25	6.3	727.13
Small Tools / Hardware	8,350.00	6.8	835.00
Sub-Total	**501,894.50**		**29,047.10**
Machinery & Vehicles			
Bobcats / Forklifts	2,227.50	.8	222.75
Trucks	37,430.00	9.7	3,743.00
Other Machinery	0.00	0.0	0.00
Sub-Total	**39,657.50**		**3,965.75**

Greenhouse Production Costs and Returns for Cucumber in North-Central Alberta

Gross Return:

Gross return (A) represents cucumber sales and some miscellaneous receipts (wage subsidy, dividend, etc.) for the 2005 crop. It amounted to $406,422 per average tomato greenhouse with 4 480 square meter production area or $90.72 per square meter.

Variable Costs:

Variable costs (B) including unpaid labour amounted to $393,280 per greenhouse ($87.79 per square meter). The most significant cost items for greenhouse cucumber production were hired labour costs at $20.10 per square meter followed by natural gas at $18.31, marketing costs at $15.26, growing media and feed at $5.54 per square meter. Detailed breakdown of all variable costs are presented in Table 11.

Capital Costs:

Capital costs (C) were comprised of property/business taxes, equipment and building depreciation, lease payments and actual capital interest paid. The average total capital costs for a cucumber producing greenhouse was $61,274 or $13.68 per square meter. Almost half of the capital cost was equipment and building depreciation.

Cash Costs:

Cash Costs (D) comprise of out-of-pocket costs incurred during cucumber production period. These costs were estimated at $404,720 per average cucumber producing greenhouse with a production area of 4 480 square meter. In terms of per square meter, these costs were $90.34.

Total Production Costs:

Average total production costs for cucumber producing greenhouse were calculated to be $454,560 or $101.47 per square meter for the 2005 crop year. The most significant cost items for cucumber production was hired labour costs at 22 percent, followed by natural gas at 18 percent and marketing costs at 15 percent. Details on various costs are presented in Table 9. Figure 4 presents the breakdown of major production costs for greenhouse cucumber production in north-central Alberta.

Management Indicators:

Management indicators in this report present data on gross margin, returns to unpaid labour, investment and equity. Gross margin (F) is based on gross return (A) less cash costs (D). For an average cucumber producing greenhouse, gross margin was marginally positive at $1,702 or $0.38 per square meter.

Average return to unpaid labour was negative at $39,618 per greenhouse or $8.84 per square meter. Average return to investment was estimated as negative 0.8 percent. In terms of dollars per greenhouse it was $16,818 or $1.52 per square meter. Average return to equity was also negative at $48,138 per cucumber producing greenhouse ($10.75 per square meter). Details on management indicators are presented in Table 11.

Table 11 **North-Central Alberta**

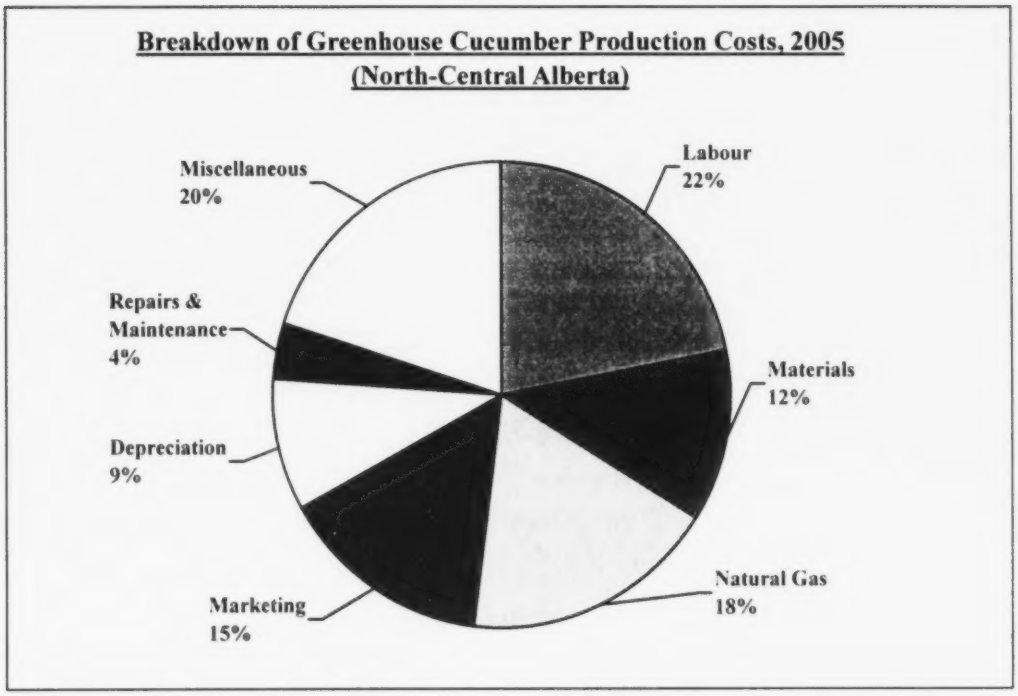
Production Costs and Returns for Cucumber Producing Greenhouses, 2005

Production Area: 4,480 sq.m.

Number of producers: 4

				Total $	$/sq. m.
(A)					
	1. Crop Sales - Imputed Value of Production			401,172.00	89.55
	2. Crop Insurance Receipts			0.00	0.00
	3. Miscellaneous Receipts			5,250.00	1.17
	GROSS RETURN			**406,422.00**	**90.72**
(B)					
	1. Growing Media, Seed/Cuttings			24,831.25	5.54
	2. Fertilizer & Chemicals			24,100.00	5.38
	3. Greenhouse Insurance			10,501.75	2.34
	4. Trays, Boxes & Other Packaging			4,750.00	1.06
	5. Freight and /or Trucking Costs			5,225.00	1.17
	6. Auto Fuel, Repairs, Licenses & Auto Ins.			10,447.00	2.33
	7. Repairs - Buildings and Equipments			17,333.25	3.87
	8. Utilities: Natural Gas	0.00 GJ		82,041.25	18.31
	9. Electricity	0.00 KW		19,035.00	4.25
	10. Water	0.00 M^3		0.00	0.00
	11. Phone			2,583.25	.58
	12. Custom Work & Specialized Labour			5,323.00	1.19
	13. Marketing Costs			68,342.50	15.26
	14. Assoc. Dues, Prof'l Fees & Promotion			3,620.75	.81
	15. Small Tools, Supplies & Misc. Expenses			11,516.75	2.57
	16. Operating Interest Paid			1,714.50	.38
	17. Labour Insurance / Benefits			3,355.75	.75
	18. Hired Labour	7956.75 hours		90,045.88	20.10
	19. Unpaid Labour	1065.00 hours		8,520.00	1.90
	VARIABLE COSTS			**393,286.88**	**87.79**
(C)					
	1. Property / Business taxes			1,165.75	.26
	2. Equipment & Building	a) Depreciation		41,320.80	9.22
		b) Lease Payments		0.00	0.00
	3. Paid Capital Interest			18,787.00	4.19
	TOTAL CAPITAL COSTS			**61,273.55**	**13.68**
(D)	**CASH COSTS**	**(B+C-B19-C2a)**		**404,719.63**	**90.34**
(E)	**TOTAL PRODUCTION COSTS**	**(B+C)**		**454,560.43**	**101.47**
(F)	**GROSS MARGIN**	**(A-D)**		**1,702.37**	**.38**
	RETURN TO UNPAID LABOUR	**(A-E+B19)**		**(39,618.43)**	**(8.84)**
	RETURN TO INVESTMENT	**(A-E+C2a)**	-.8 %	**(6,817.63)**	**(1.52)**
	RETURN TO EQUITY	**(A-E)**		**(48,138.43)**	**(10.75)**

Figure 4


Breakdown of Greenhouse Cucumber Production Costs, 2005
(North-Central Alberta)
Labour
22%
Materials
12%
Natural Gas
18%
Marketing
15%
Depreciation
9%
Repairs &
Maintenance
4%
Miscellaneous
20%

SECTION V

Greenhouse Production Costs and Returns for Tomatoes

Greenhouse tomato production has more than doubled during the last decade. The greenhouse area under tomato production was 101 095 square meter or about 10 hectares in 2005. It represents about eight percent of the greenhouse area in Alberta. The number of greenhouse operations producing tomatoes was reported at 69 in the 2005 survey of this industry.

Data on the greenhouse production costs and returns for tomatoes was obtained from eleven (11) greenhouse operations across the province. Although the sample size for tomato production costs and returns was relatively small, information presented in the following two tables can be used for guideline purposes. Eleven greenhouses were further divided into two groups, i.e. Medicine Hat/Redcliff (6) and north central Alberta (5) for cost comparison purposes.

Investment for Greenhouses Producing Tomatoes in Medicine Hat/Redcliff

Greenhouse investment data for tomato production was obtained from six greenhouse operations from the Medicine Hat and Redcliff area. Average size of greenhouse area for tomato producing greenhouses was 5 985 square meter. Average land area associated with these greenhouses was about four acres valued at $77,500 or $12.95 per square meter.

Buildings investment for tomato producing greenhouses was reported at $291,458 or $48.70 per square meter. Machinery and equipment investment for these greenhouses amounted to $467,783 per greenhouse or $78.16 per square meter. A detailed breakdown of land, buildings, machinery and equipment investment are presented in Table 12. Total investment for tomato producing greenhouses was estimated at $836,741 or $139.80 per square meter.

Greenhouse Production Costs and Returns for Tomatoes in Medicine Hat/Redcliff

Gross Return:

Gross return (A) represents tomato sales and some miscellaneous receipts (wage subsidy, dividend, etc.) during the 2005 crop year. It amounted to $508,760 per average tomato greenhouse with 5 603 square meter production area or $90.80 per square meter.

Variable Costs:

Variable costs (B) including unpaid labour amounted to $471,842 per greenhouse ($84.21 per square meter). The most significant cost items for greenhouse tomato production were hired labour costs at $21.80 per square meter followed by marketing costs at $19.56 and natural gas costs at $15.89 per square meter. Detailed breakdown of all variable costs are presented in Table 13.

Table 12 Medicine Hat or Redcliff

Average Investment for Tomato Producing Greenhouses, 2005

Greenhouse Area: 5,985 sq.m.

INVESTMENT SUMMARY:	Total $	$/sq. m.
Land	77,500.00	12.95
Buildings	291,458.00	48.70
Machinery & Equipment	467,783.33	78.16
TOTAL INVESTMENT	**836,741.33**	**139.80**

INVESTMENT DETAIL:	Enterprise Value ($)	Age (Years)	Depreciation ($)
Land -Building Site:	**77,500.00**		
Greenhouse Buildings:	**291,458.00**	**9.3**	**10,201.03**
Equipment:			
Refrigeration / Freezer Storage	166.67	1.5	8.33
Warehouses / Storage Sheds	7,166.67	2.7	358.33
Fuel Tanks	183.33	2.8	9.17
Houses(25%)	37,291.67	7.7	1,864.58
Other Buildings	0.00	0.0	0.00
Lighting	333.33	1.3	16.67
Heating System	235,000.00	7.5	11,750.00
Ventilation System	30,333.33	5.2	1,516.67
Humidity Control	27,833.33	7.5	1,391.67
Benches	0.00	0.0	0.00
Irrigation System	21,166.67	6.2	2,116.67
Water Pumps / Sand Filters	4,666.67	6.2	466.67
Soil Mixers / Flat Fillers /Seedling Lines	0.00	0.0	0.00
Generators	16,833.33	7.3	1,683.33
Roto-Tillers	400.00	2.5	40.00
Storage / Mixing Tanks	2,250.00	5.2	225.00
Sterilizers	0.00	0.0	0.00
Sprayers	2,666.67	4.7	266.67
Carts / Dolleys	25,583.33	5.2	2,558.33
Fertilizer Injectors	3,050.00	5.0	305.00
Small Tools / Hardware	7,083.33	6.1	708.33
Sub-Total	**422,008.33**		**25,285.42**
Machinery & Vehicles			
Bobcats / Forklifts	11,500.00	5.3	1,150.00
Trucks	34,275.00	14.7	3,427.50
Other Machinery	0.00	0.0	0.00
Sub-Total	**45,775.00**		**4,577.50**

Table 13 **Medicine Hat or Redcliff**

Production Costs and Returns for Tomato Producing Greenhouses, 2005

Production Area: 5,603 sq.m.

Number of producers: 6

				Total $	$/sq. m.
(A)					
	1. Crop Sales - Imputed Value of Production			473,445.83	84.49
	2. Crop Insurance Receipts			0.00	0.00
	3. Miscellaneous Receipts			35,314.00	6.30
	GROSS RETURN			**508,759.83**	**90.80**
(B)					
	1. Growing Media, Seed/Cuttings			27,684.33	4.94
	2. Fertilizer & Chemicals			33,983.50	6.06
	3. Greenhouse Insurance			11,566.67	2.06
	4. Trays, Boxes & Other Packaging			1,366.67	.24
	5. Freight and /or Trucking Costs			5,450.00	.97
	6. Auto Fuel, Repairs, Licenses & Auto Ins.			9,426.67	1.68
	7. Repairs - Buildings and Equipments			10,566.67	1.89
	8. Utilities: Natural Gas	0.00 GJ		89,030.83	15.89
	9. Electricity	0.00 KW		16,089.67	2.87
	10. Water	0.00 M^3		4,300.00	.77
	11. Phone			2,267.50	.40
	12. Custom Work & Specialized Labour			929.17	.17
	13. Marketing Costs			109,594.00	19.56
	14. Assoc. Dues, Prof'l Fees & Promotion			13,097.33	2.34
	15. Small Tools, Supplies & Misc. Expenses			6,282.50	1.12
	16. Operating Interest Paid			1,339.17	.24
	17. Labour Insurance / Benefits			5,906.17	1.05
	18. Hired Labour	12591.33	hours	122,128.92	21.80
	19. Unpaid Labour	104.00	hours	832.00	.15
	VARIABLE COSTS			**471,841.75**	**84.21**
(C)					
	1. Property / Business taxes			5,889.83	1.05
	2. Equipment & Building	a) Depreciation		40,063.95	7.15
		b) Lease Payments		0.00	0.00
	3. Paid Capital Interest			13,875.00	2.48
	TOTAL CAPITAL COSTS			**59,828.78**	**10.68**
(D)	**CASH COSTS**	**(B+C-B19-C2a)**		**490,774.58**	**87.59**
(E)	**TOTAL PRODUCTION COSTS**	**(B+C)**		**531,670.53**	**94.89**
(F)	**GROSS MARGIN**	**(A-D)**		**17,985.25**	**3.21**
	RETURN TO UNPAID LABOUR	**(A-E+B19)**		**(22,078.70)**	**(3.94)**
	RETURN TO INVESTMENT	**(A-E+C2a)**	2.1 %	**17,153.25**	**3.06**
	RETURN TO EQUITY	**(A-E)**		**(22,910.70)**	**(4.09)**

Capital Costs:

Capital costs (C) were comprised of property/business taxes, equipment and building depreciation, lease payments and actual capital interest paid. The average total capital costs for a tomato-producing greenhouse was $59,829 or $10.68 per square meter. Almost two-third of the capital cost was equipment and building depreciation.

Cash Costs:

Cash Costs (D) comprise of out-of-pocket costs incurred during the tomato production period. These costs were estimated at $490,775 per average tomato producing greenhouse with a production area of 5 603 square meter. In terms of per square meter, these costs were $87.59.

Total Production Costs:

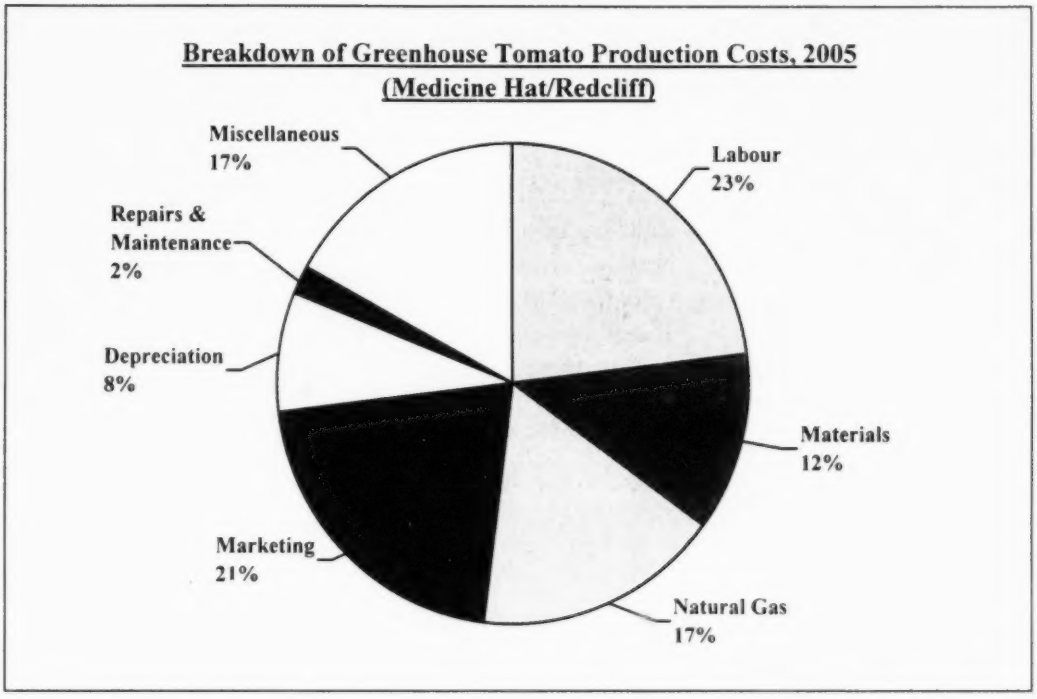
Average total production costs for tomato producing greenhouses in the Medicine Hat/Redcliff area were calculated to be $531,671 or $94.89 per square meter for the 2005 crop. The most significant cost items for tomato production was hired labour costs at 23 percent, followed by manufacturing costs at 21 percent and natural gas costs at 17 percent. Details on various costs are presented in Table 13. Figure 5 presents the breakdown of major production costs for greenhouse tomato production in Medicine Hat/Redcliff area.

Management Indicators:

Management indicators in this report present data on gross margin, returns to unpaid labour, investment and equity. Gross margin (F) is based on gross return (A) less cash costs (D). For an average tomato-producing greenhouse, gross margin was positive at $17,985 or $3.21 per square meter.

Average return to unpaid labour was negative at $22,079 per greenhouse or $3.94 per square meter. Average return to investment was estimated at 2.1 percent. In terms of dollars per greenhouse it was $17,153 or $3.06 per square meter. Average return to equity was negative at $22,911 per tomato-producing greenhouse ($4.09 per square meter). Details on management indicators are presented in Table 13.

Figure 5



Investment for Greenhouses Producing Tomatoes in North-Central Alberta

Greenhouse investment data for tomato production in north-central Alberta was obtained from five greenhouse operations across the province. Average size of greenhouse area for tomato producing greenhouses was 5 985 square meter. Average land area associated with these greenhouses was over four acres valued at $77,500 or $12.95 per square foot.

Buildings investment for tomato producing greenhouses was reported at $291,458 or $48.70 per square meter. Machinery and equipment investment for these greenhouses amounted to $467,783 per greenhouse or $78.16 per square meter. A detailed breakdown of land, buildings, machinery and equipment investment are presented in Table 14. Total investment for tomato producing greenhouses was estimated at $836,741 or $78.16 per square foot.

Greenhouse Production Costs and Returns for Tomatoes in North-Central Alberta

Gross Return:

Gross return (A) represents tomato sales and some miscellaneous receipts (wage subsidy, dividend, etc.) for the 2005 crop. It amounted to $416,988 per average tomato greenhouse with 4 262 square meter production area or $97.84 per square meter.

Table 14 North-Central Alberta

Average Investment for Tomato Producing Greenhouses, 2005

Greenhouse Area: 4,462 sq.m.

INVESTMENT SUMMARY:	Total $	$/sq. m.
Land	59,760.00	13.39
Buildings	243,284.00	54.52
Machinery & Equipment	495,375.40	111.02
TOTAL INVESTMENT	**798,419.40**	**178.94**

INVESTMENT DETAIL:	Enterprise Value ($)	Age (Years)	Depreciation ($)
Land -Building Site:	**59,760.00**		
Greenhouse Buildings:	**243,284.00**	**10.1**	**8,514.94**
Equipment:			
Refrigeration / Freezer Storage	588.00	4.8	29.40
Warehouses / Storage Sheds	41,112.00	9.6	2,055.60
Fuel Tanks	505.40	9.6	25.27
Houses(25%)	40,000.00	27.2	2,000.00
Other Buildings	0.00	0.0	0.00
Lighting	0.00	0.0	0.00
Heating System	207,600.00	8.5	10,380.00
Ventilation System	37,000.00	6.5	1,850.00
Humidity Control	27,000.00	8.1	1,350.00
Benches	3,200.00	1.8	160.00
Irrigation System	15,320.00	4.5	1,532.00
Water Pumps / Sand Filters	18,180.00	3.4	1,818.00
Soil Mixers / Flat Fillers /Seedling Lines	280.00	.8	28.00
Generators	10,150.00	5.8	1,015.00
Roto-Tillers	0.00	0.0	0.00
Storage / Mixing Tanks	7,480.00	5.0	748.00
Sterilizers	6,560.00	1.0	656.00
Sprayers	1,007.00	2.0	100.70
Carts / Dolleys	18,884.00	4.2	1,888.40
Fertilizer Injectors	2,740.00	4.0	274.00
Small Tools / Hardware	13,420.00	7.6	1,342.00
Sub-Total	**451,026.40**		**27,252.37**
Machinery & Vehicles			
Bobcats / Forklifts	21.00	5.0	2.10
Trucks	33,328.00	10.4	3,332.80
Other Machinery	11,000.00	.9	1,100.00
Sub-Total	**44,349.00**		**4,434.90**

Variable Costs:

Variable costs (B) including unpaid labour amounted to $348,003 per greenhouse ($81.66 per square meter). The most significant cost items for greenhouse tomato production were hired labour costs at $24.98 per square meter followed by natural gas at $18.71, marketing costs at $11.71 and fertilizer and chemicals at $6.08 per square meter. Detailed breakdown of all variable costs are presented in Table 15.

Capital Costs:

Capital costs (C) were comprised of property/business taxes, equipment and building depreciation, lease payments and actual capital interest paid. The average total capital costs for a tomato-producing greenhouse was $75,076 or $17.62 per square meter. Almost more than half of the capital cost was equipment and building depreciation.

Cash Costs:

Cash Costs (D) comprise of out-of-pocket costs incurred during the tomato production period. These costs were estimated at $377,594 per average tomato producing greenhouse with a production area of 4 262 square meter. In terms of per square meter, these costs were $88.60.

Total Production Costs:

Average total production costs for tomato producing greenhouse were calculated to be $423,079 or $99.27 per square meter for the 2005 crop year. The most significant cost items for tomato production was labour costs at 20 percent, followed by natural gas at 16 percent and marketing costs at 13 percent. Details on various costs are presented in Table 15. Figure 6 presents the breakdown of major production costs for greenhouse tomato production in north-central Alberta.

Management Indicators:

Management indicators in this report present data on gross margin, returns to unpaid labour, investment and equity. Gross margin (F) is based on gross return (A) less cash costs (D). For an average tomato-producing greenhouse, gross margin was positive at $39,394 or $9.24 per square meter.

Average return to unpaid labour was marginally negative at $808 per greenhouse or $0.19 per square meter. Average return to investment was estimated at 4.3 percent. In terms of dollars per greenhouse it was $34,111 or $8.00 per square meter. Average return to equity was negative at $6,091 per tomato-producing greenhouse ($1.43 per square meter). Details on management indicators are presented in Table 15.

Table 15 North-Central Alberta

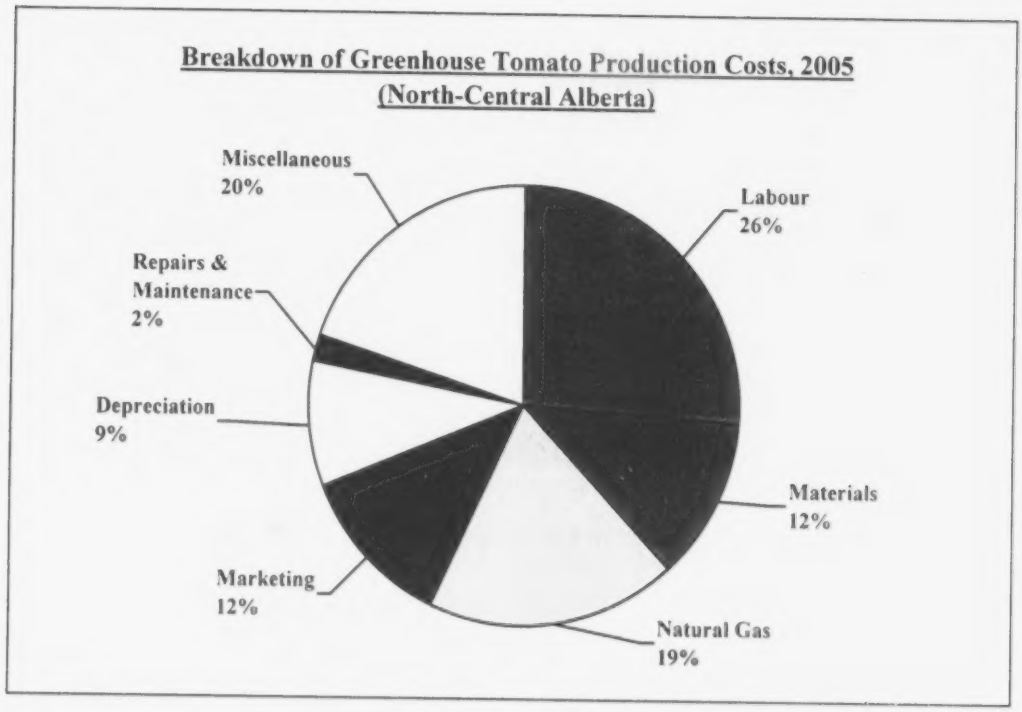
Production Costs and Returns for Tomato Producing Greenhouses, 2005

Production Area: 4,262 sq.m.

Number of producers: 5

				Total $	$/sq. m.
(A)					
	1. Crop Sales - Imputed Value of Production			416,988.00	97.84
	2. Crop Insurance Receipts			0.00	0.00
	3. Miscellaneous Receipts			0.00	0.00
	GROSS RETURN			**416,988.00**	**97.84**
(B)					
	1. Growing Media, Seed/Cuttings			22,100.00	5.19
	2. Fertilizer & Chemicals			25,910.00	6.08
	3. Greenhouse Insurance			11,999.00	2.82
	4. Trays, Boxes & Other Packaging			850.00	.20
	5. Freight and /or Trucking Costs			1,220.00	.29
	6. Auto Fuel, Repairs, Licenses & Auto Ins.			6,743.00	1.58
	7. Repairs - Buildings and Equipments			6,210.00	1.46
	8. Utilities: Natural Gas	0.00 GJ		79,756.00	18.71
	9. Electricity	0.00 KW		12,824.00	3.01
	10. Water	0.00 M^3		1,320.00	.31
	11. Phone			1,244.20	.29
	12. Custom Work & Specialized Labour			1,313.40	.31
	13. Marketing Costs			50,132.00	11.76
	14. Assoc. Dues, Prof'l Fees & Promotion			3,659.20	.86
	15. Small Tools, Supplies & Misc. Expenses			5,275.00	1.24
	16. Operating Interest Paid			1,728.00	.41
	17. Labour Insurance / Benefits			3,977.00	.93
	18. Hired Labour	10258.00	hours	106,458.80	24.98
	19. Unpaid Labour	660.40	hours	5,283.20	1.24
	VARIABLE COSTS			**348,002.80**	**81.66**
(C)					
	1. Property / Business taxes			1,014.00	.24
	2. Equipment & Building	a) Depreciation		40,202.21	9.43
		b) Lease Payments		1,786.00	.42
	3. Paid Capital Interest			32,074.20	7.53
	TOTAL CAPITAL COSTS			**75,076.41**	**17.62**
(D)	**CASH COSTS**	(B+C-B19-C2a)		**377,593.80**	**88.60**
(E)	**TOTAL PRODUCTION COSTS**	(B+C)		**423,079.21**	**99.27**
(F)	**GROSS MARGIN**	(A-D)		**39,394.20**	**9.24**
	RETURN TO UNPAID LABOUR	(A-E+B19)		**(808.01)**	**(.19)**
	RETURN TO INVESTMENT	(A-E+C2a)	4.3 %	**34,111.00**	**8.00**
	RETURN TO EQUITY	(A-E)		**(6,091.21)**	**(1.43)**

Figure 6


Breakdown of Greenhouse Tomato Production Costs, 2005
(North-Central Alberta)
Miscellaneous
20%
Labour
26%
Repairs &
Maintenance
2%
Depreciation
9%
Materials
12%
Marketing
12%
Natural Gas
19%

SECTION VI

Greenhouse Production Costs and Returns for Peppers

Greenhouse pepper production in Alberta has increased significantly during the last eight to ten years. At the start of the nineties there were very few greenhouse operations that produced peppers. The 2003 greenhouse industry survey reported 28 operations producing peppers. Greenhouse pepper production represents five percent of the total greenhouse area in the province and about 12 percent of the area under vegetables.

Investment production costs and returns presented in Tables 16 and 17 were obtained from four greenhouse operations in north-central Alberta. Two pepper producing greenhouse operations provided data from the Medicine Hat/Redcliff area. Data obtained from these two operations is not included in the report in order to preserve confidentiality of the study participants. Data was collected during the winter and spring of 2006 on peppers produced in 2005.

Investment for Greenhouses Producing Peppers

Greenhouse investment data was obtained from four pepper producing greenhouse operations in the north-central Alberta. Each operator was asked to value the greenhouse structure based on the current market costs of replacement. In order to calculate depreciation of buildings, machinery and equipment, they were also asked to provide an estimate on life of the structure and equipment.

Average land area associated with greenhouses producing peppers was just over ten acres. It was valued at $189,375 or $24.02 per square meter. Average greenhouse area for pepper production was reported at 7 886 square meter for the 2005 crop year.

Buildings investment for pepper producing greenhouses was reported at $453,000 per greenhouse or $57.45 per square meter. Machinery and equipment investment for this greenhouse was estimated at $943,205 or $119.61 per square meter. When land, buildings, machinery and equipment investments were combined, total investment for pepper producing greenhouses amounted to $1,585,580 or $201.67 per square meter of greenhouse area. Details on land, buildings, machinery and equipment investments are provided in Table 16.

Greenhouse Production Costs and Returns for Peppers

Gross Return:

Gross return (A) represents total value of pepper sales during the crop year. Gross return from an average greenhouse producing peppers including miscellaneous receipts was $688,834 or $94.30 per square meter (Table 17). The average size of the greenhouse was 7 305 square meter. Among the three major greenhouse vegetables (cucumbers, tomatoes and peppers), peppers showed higher return per square meter primarily due to better price.

Table 16 North-Central Alberta

Average Investment for Pepper Producing Greenhouses, 2005

Greenhouse Area: 7,886 sq.m.

INVESTMENT SUMMARY:	Total $	$/sq. m.
Land	189,375.00	24.02
Buildings	453,000.00	57.45
Machinery & Equipment	943,205.00	119.61
TOTAL INVESTMENT	**1,585,580.00**	**201.07**

INVESTMENT DETAIL:	Enterprise Value ($)	Age (Years)	Depreciation ($)
Land -Building Site:	**189,375.00**		
Greenhouse Buildings:	**453,000.00**	**6.0**	**15,855.00**
Equipment:			
Refrigeration / Freezer Storage	590.00	4.5	29.50
Warehouses / Storage Sheds	26,275.00	5.0	1,313.75
Fuel Tanks	232.50	2.5	11.63
Houses(25%)	34,687.50	47.5	1,734.38
Other Buildings	0.00	0.0	0.00
Lighting	0.00	0.0	0.00
Heating System	634,400.00	5.8	31,720.00
Ventilation System	0.00	0.0	0.00
Humidity Control	38,125.00	3.8	1,906.25
Benches	0.00	0.0	0.00
Irrigation System	56,475.00	3.3	5,647.50
Water Pumps / Sand Filters	8,575.00	5.0	857.50
Soil Mixers / Flat Fillers /Seedling Lines	0.00	0.0	0.00
Generators	14,937.50	4.0	1,493.75
Roto-Tillers	0.00	0.0	0.00
Storage / Mixing Tanks	11,400.00	5.0	1,140.00
Sterilizers	0.00	0.0	0.00
Sprayers	1,535.00	1.5	153.50
Carts / Dolleys	37,200.00	5.0	3,720.00
Fertilizer Injectors	16,928.75	5.0	1,692.88
Small Tools / Hardware	4,750.00	2.8	475.00
Sub-Total	**886,111.25**		**51,895.63**
Machinery & Vehicles			
Bobcats / Forklifts	4,933.75	9.5	493.38
Trucks	52,160.00	6.2	5,216.00
Other Machinery	0.00	0.0	0.00
Sub-Total	**57,093.75**		**5,709.38**

Table 17 North-Central Alberta

Production Costs and Returns for Pepper Producing Greenhouses, 2005

Production Area: 7,305 sq.m.

Number of producers: 4

				Total $	$/sq. m.
(A)					
	1. Crop Sales - Imputed Value of Production			685,684.00	93.87
	2. Crop Insurance Receipts			0.00	0.00
	3. Miscellaneous Receipts			3,150.00	.43
	GROSS RETURN			**688,834.00**	**94.30**
(B)					
	1. Growing Media, Seed/Cuttings			56,500.00	7.73
	2. Fertilizer & Chemicals			29,287.50	4.01
	3. Greenhouse Insurance			11,114.50	1.52
	4. Trays, Boxes & Other Packaging			0.00	0.00
	5. Freight and /or Trucking Costs			5,004.00	.69
	6. Auto Fuel, Repairs, Licenses & Auto Ins.			10,781.25	1.48
	7. Repairs - Buildings and Equipments			19,051.75	2.61
	8. Utilities: Natural Gas	0.00 GJ		142,943.25	19.57
	9. Electricity	0.00 KW		15,895.25	2.18
	10. Water	0.00 M^3		375.00	.05
	11. Phone			2,076.50	.28
	12. Custom Work & Specialized Labour			2,342.00	.32
	13. Marketing Costs			105,283.25	14.41
	14. Assoc. Dues, Prof'l Fees & Promotion			4,930.25	.67
	15. Small Tools, Supplies & Misc. Expenses			21,439.50	2.93
	16. Operating Interest Paid			1,500.50	.21
	17. Labour Insurance / Benefits			3,973.00	.54
	18. Hired Labour	12507.00 hours		132,179.63	18.09
	19. Unpaid Labour	1696.50 hours		16,197.00	2.22
	VARIABLE COSTS			**580,874.13**	**79.52**
(C)					
	1. Property / Business taxes			1,649.25	.23
	2. Equipment & Building	a) Depreciation		73,460.00	10.06
		b) Lease Payments		930.00	.13
	3. Paid Capital Interest			40,880.00	5.60
	TOTAL CAPITAL COSTS			**116,919.25**	**16.01**
(D)	**CASH COSTS**	(B+C-B19-C2a)		**608,136.38**	**83.25**
(E)	**TOTAL PRODUCTION COSTS**	(B+C)		**697,793.38**	**95.52**
(F)	**GROSS MARGIN**	(A-D)		**80,697.63**	**11.05**
	RETURN TO UNPAID LABOUR	(A-E+B19)		**7,237.63**	**.99**
	RETURN TO INVESTMENT	(A-E+C2a)	4.1 %	**64,500.63**	**8.83**
	RETURN TO EQUITY	(A-E)		**(8,959.38)**	**(1.23)**

Variable Costs:

Variable costs (B) for greenhouses producing peppers amounted to $580, 931 or $79.53 per square meter. Among all the costs, natural gas was the highest at $19.58, followed closely by hired labour at $18.09 and marketing costs at $14.41 per square meter. Meanwhile, other significant costs were growing media and seed, fertilizer and chemicals, small tools, supplies and miscellaneous expenses and repairs. A detailed breakdown of these costs is presented in Table 17.

Capital Costs:

Capital costs (C) were made up of property/business taxes, equipment and building depreciation and paid capital interest. Average total capital cost per greenhouse producing peppers amounted to $116,919 or $16.01 per square meters.

Cash Costs:

Cash costs (D) represent all costs incurred during the crop production period less unpaid labour, equipment and building depreciation. These costs were estimated at $608,193 per average greenhouse or $83.26 per square meter for pepper production.

Total Production Costs:

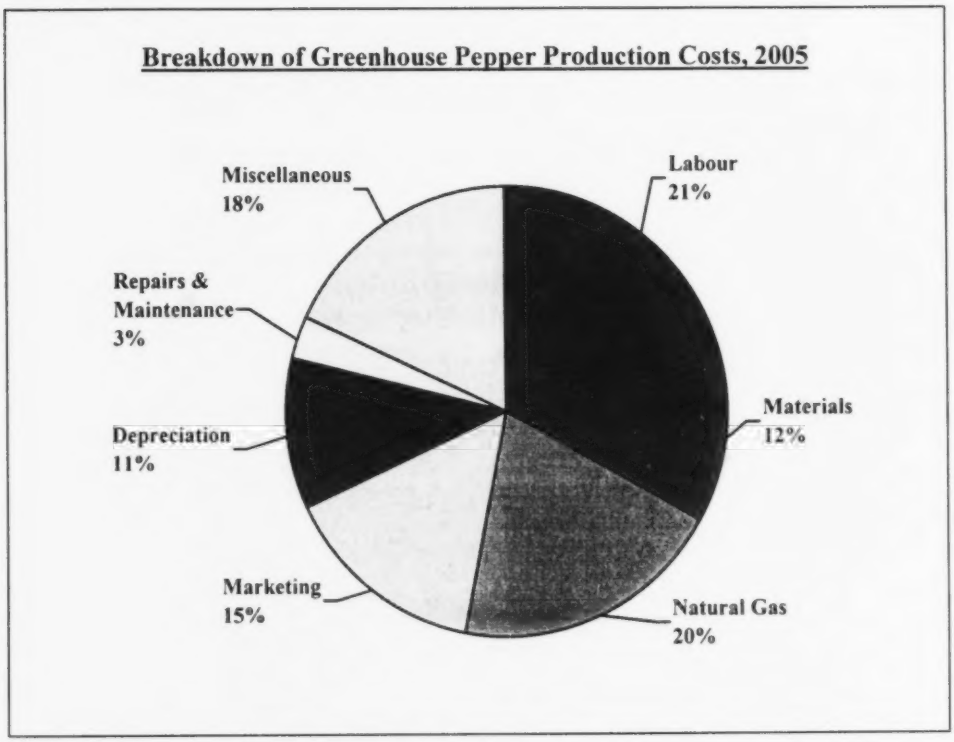
Average total production costs for pepper producing greenhouses amounted to $697,850 or $95.53 per square meter. Average size of the greenhouse producing peppers was 7 305 square meter. Details on total production costs are presented in Table 17. Figure 7 shows a breakdown of major production costs for greenhouse pepper production.

Management Indicators:

Gross margin (F) when cash costs (D) were deducted from gross return (A), average greenhouse producing peppers showed a positive gross margin of $80,641 or $11.84 per square meter. Among the three greenhouse producing vegetable crops, peppers showed the highest gross margin per square foot compared to cucumbers and tomatoes.

Average return to unpaid labour for peppers was estimated at $7,181 per greenhouse or $0.98 per square meter. The average return to investment was calculated at 4.1 percent. The return to investment for a pepper producing greenhouse was $64,444 or $8.82 per square meter. Average return to equity was negative at $9,016 per greenhouse ($1.23 per square meter). Details on management indicators are presented in Table 17.

Figure 7


Breakdown of Greenhouse Pepper Production Costs, 2005
Miscellaneous
18%
Labour
21%
Repairs &
Maintenance
3%
Materials
12%
Depreciation
11%
Marketing
15%
Natural Gas
20%

SECTION VII

Greenhouse Production Costs and Returns for Bedding Plants/Ornamentals

Greenhouse bedding plants production in Alberta has been increasing steadily over the years despite competition from cheap imports from British Columbia and south of the border. During the 2003 greenhouse industry survey, the area under greenhouse bedding plants was reported just over 324 819 square meter or 25 percent of the total greenhouse area in the province. Number of greenhouse operations producing bedding plants was reported around 65.

Greenhouse production of potted flowers and ornamentals was estimated at 60 400 square meter or about five percent of the greenhouse area in Alberta in 2003. When this area was combined with the area under greenhouse bedding plants, total area under these crops was 358 900 square meter or about 36 hectares. It represented about 28 percent of the greenhouse area in Alberta.

Investment and production costs and returns data presented in Tables 18 and 19 were obtained from six greenhouse operations across the province. Although the sample size for the group of greenhouse operations was relatively small, yet the results should be considered as useful guidelines for information and planning purposes.

Investment for Greenhouses Producing Bedding Plants/Ornamentals

Greenhouse investment data was obtained directly from study participants through personal survey. Each operator was asked to value the greenhouse structure based on the current market costs of replacement. They were also asked to provide an estimate on life of the structure to calculate depreciation costs for buildings and equipment.

Average land area associated with greenhouse operations producing bedding plants and ornamentals was around 36 hectares. Land was valued at $45,695 per hectare as it had to be located close to all services required for a greenhouse operation. Total land cost was estimated at $34,923 per average greenhouse area of 1 692 square meter or $17.82 per square meter.

Building investment for the above sized greenhouse amounted to $128,750 or $65.69 per square meter. Machinery and equipment investment was estimated at $178,482 per average greenhouse ($91.06 per square meter). A detailed breakdown of land, buildings, machinery and equipment investment is presented in Table 18. It amounted to $342,154 per average greenhouse operation producing bedding plants and ornamentals. In terms of dollars per square meter investment was estimated at $174.57.

Average Investment for Bedding Plant/ Ornamental Greenhouses, 2005

Greenhouse Area: 1,960 sq.m.

INVESTMENT SUMMARY:	Total $	$/sq. m.
Land	34,922.50	17.82
Buildings	128,750.00	65.69
Machinery & Equipment	178,481.67	91.06
TOTAL INVESTMENT	**342,154.17**	**174.57**

INVESTMENT DETAIL:	Enterprise Value ($)	Age (Years)	Depreciation ($)
Land -Building Site:	**34,922.50**		
Greenhouse Buildings:	**128,750.00**	**18.5**	**4,506.25**
Equipment:			
Refrigeration / Freezer Storage	0.00	0.0	0.00
Warehouses / Storage Sheds	9,666.67	13.8	483.33
Fuel Tanks	66.67	3.3	3.33
Houses(25%)	21,666.67	22.3	1,083.33
Other Buildings	0.00	0.0	0.00
Lighting	0.00	0.0	0.00
Heating System	39,833.33	12.2	1,991.67
Ventilation System	10,833.33	14.1	541.67
Humidity Control	0.00	0.0	0.00
Benches	29,666.67	11.5	1,483.33
Irrigation System	8,100.00	10.3	810.00
Water Pumps / Sand Filters	3,900.00	5.2	390.00
Soil Mixers / Flat Fillers /Seedling Lines	2,916.67	6.2	291.67
Generators	5,833.33	9.2	583.33
Roto-Tillers	575.00	3.5	57.50
Storage / Mixing Tanks	1,233.33	8.0	123.33
Sterilizers	533.33	4.5	53.33
Sprayers	1,090.00	2.3	109.00
Carts / Dolleys	3,986.67	4.3	398.67
Fertilizer Injectors	1,400.00	6.3	140.00
Small Tools / Hardware	14,350.00	6.6	1,435.00
Sub-Total	**155,651.67**		**9,978.50**
Machinery & Vehicles			
Bobcats / Forklifts	5,500.00	2.7	550.00
Trucks	17,330.00	8.9	1,733.00
Other Machinery	0.00	0.0	0.00
Sub-Total	**22,830.00**		**2,283.00**

Greenhouse Production Costs and Returns for Bedding Plants/Ornamentals

Gross Return:

Gross return (A) represents sales of bedding plants/ornamentals during the 2000 crop production year. For a greenhouse with a production area of 1 671 square meter gross return was calculated at $226,283 per average greenhouse or $135.39 per square meter.

Variable Costs:

Variable costs (B) represent all out-of-pocket costs including unpaid labour. These costs were estimated at $172,986 per average greenhouse of 1 671 square meter. In terms of dollars per square meter, average variable costs were $103.50 square meter. The most significant cost items were hired labour at $28.19 per square meter, followed by growing media, seed/cuttings at $21.27 and natural gas costs at $13.94 per square meter. Details on all variable cost items are presented in Table 19.

Capital Costs:

Capital costs (C) include property/business taxes, equipment and building depreciation and actual interest paid on capital. These costs were estimated at $22,826 per average greenhouse or $13.66 per square meter.

Cash Costs:

Cash costs (D) represent all out-of-pocket costs incurred during the bedding plants/ornamentals production. These amounted to $166,098 per greenhouse with an average area of 1 671 square meter ($98.78 square meter).

Total Production Costs:

Average total production costs (E) for bedding plants/ornamentals producing greenhouses were calculated at $195,812. These were $117.96 per square meter based on greenhouse production area. Detailed breakdowns of various cost items are given in Table 19. Figure 8 shows the relative proportion of all production costs for greenhouse bedding plants/ornamentals.

Management Indicators:

Gross margin (F) is equal to gross return (A) less cash costs (D). It was calculated at $61,166 for an average greenhouse producing bedding plants/ornamentals. In terms of per square meter, gross margin was $36.61. It was the highest gross margin recorded when compared with other greenhouse crops.

Average return to unpaid labour for these greenhouses was $44,418 ($26.58 per square meter) for bedding plants/ornamentals produced in 2005. Again return per square meter was the highest for these crops.

Table 19 Alberta

Production Costs and Returns for Bedding Plant/ Ornamental Greenhouses, 2005

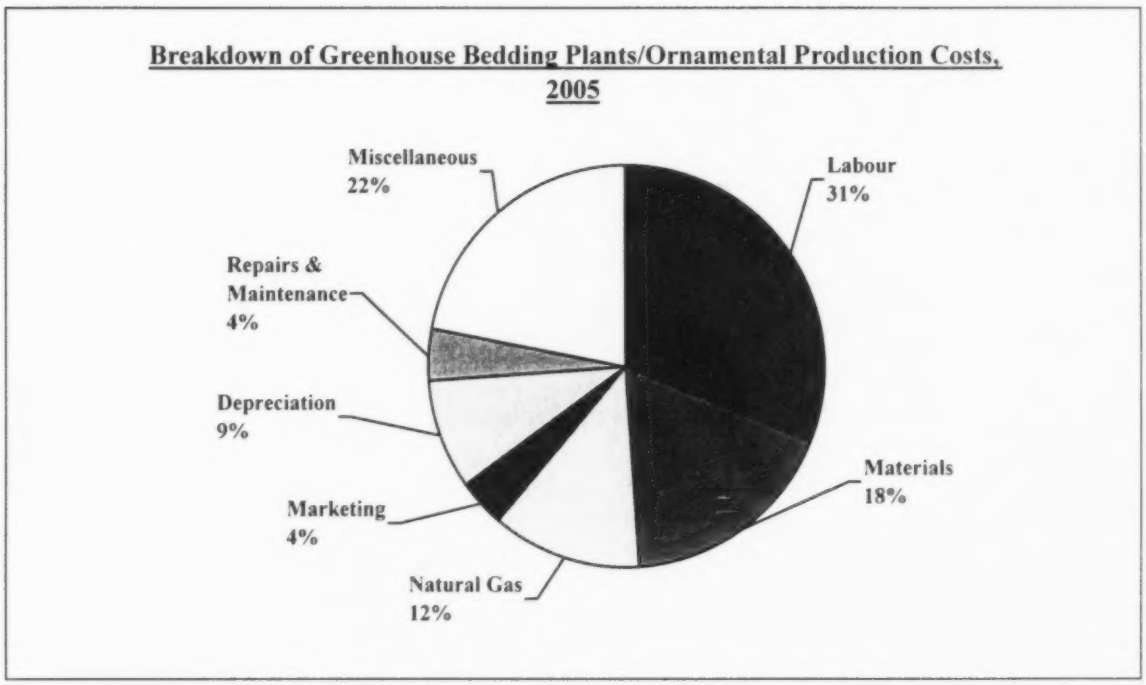
Production Area: 1,671 sq.m.

Number of producers: 6

			Total $	$/sq. m.
(A)				
	1. Crop Sales - Imputed Value of Production		225,683.33	135.03
	2. Crop Insurance Receipts		0.00	0.00
	3. Miscellaneous Receipts		600.00	.36
	GROSS RETURN		**226,283.33**	**135.39**
(B)				
	1. Growing Media, Seed/Cuttings		33,237.50	19.89
	2. Fertilizer & Chemicals		2,298.33	1.38
	3. Greenhouse Insurance		4,798.84	2.87
	4. Trays, Boxes & Other Packaging		9,650.00	5.77
	5. Freight and /or Trucking Costs		1,571.67	.94
	6. Auto Fuel, Repairs, Licenses & Auto Ins.		5,790.00	3.46
	7. Repairs - Buildings and Equipments		7,666.67	4.59
	8. Utilities: Natural Gas	0.00 GJ	23,295.67	13.94
	9. Electricity	0.00 KW	3,362.50	2.01
	10. Water	0.00 M^3	570.00	.34
	11. Phone		1,469.17	.88
	12. Custom Work & Specialized Labour		0.00	0.00
	13. Marketing Costs		2,800.00	1.68
	14. Assoc. Dues, Prof'l Fees & Promotion		5,367.83	3.21
	15. Small Tools, Supplies & Misc. Expenses		6,177.00	3.70
	16. Operating Interest Paid		1,600.00	.96
	17. Labour Insurance / Benefits		2,266.67	1.36
	18. Hired Labour	5623.67 hours	47,117.08	28.19
	19. Unpaid Labour	1743.33 hours	13,946.67	8.34
	VARIABLE COSTS		**172,985.59**	**103.50**
(C)				
	1. Property / Business taxes		2,425.33	1.45
	2. Equipment & Building	a) Depreciation	16,767.75	10.03
		b) Lease Payments	0.00	0.00
	3. Paid Capital Interest		3,633.33	2.17
	TOTAL CAPITAL COSTS		**22,826.42**	**13.66**
(D)	**CASH COSTS**	**(B+C-B19-C2a)**	**165,097.59**	**98.78**
(E)	**TOTAL PRODUCTION COSTS**	**(B+C)**	**195,812.01**	**117.16**
(F)	**GROSS MARGIN**	**(A-D)**	**61,185.74**	**36.61**
	RETURN TO UNPAID LABOUR	**(A-E+B19)**	**44,417.99**	**26.58**
	RETURN TO INVESTMENT	**(A-E+C2a)** 13.8 %	**47,239.07**	**28.26**
	RETURN TO EQUITY	**(A-E)**	**30,471.32**	**18.23**

Average return to investment was estimated at 13.8 percent. In terms of total amount it was $47,239 per average greenhouse or $28.26 per square meter. Return to equity amounted to $30,471 per greenhouse or $18.23 per square meter. Details on gross return, production costs and management indicators are presented in Table 19.

Figure 8



SECTION VIII

Greenhouse Production Costs and Returns for Cut Flowers

Greenhouse area in Alberta under cut flowers is relatively small compared to other major greenhouse crops. In the 2003 greenhouse industry survey, the area for cut flowers was estimated at 51 531 square meter or over four percent of the total greenhouse area in the province. Number of greenhouse operations producing cut flowers was 26 in 2003. Data on greenhouse investment, gross return and production costs was obtained from six greenhouse operations across the province. Average size of the greenhouse producing cut flowers was 3 191 per square meter.

Investment for Greenhouses Producing Cut Flowers

Land area associated with an average greenhouse was about 1.2 hectares. Land was valued at $54,520 or $17.09 per square meter. Building investment for cut flower greenhouses was estimated at $205,000 or $64.25 per square meter. Machinery and equipment represented almost 62 percent of the total investment, which amounted to $424,588 or $133.07 per square meter. Total value of investment for a 3 191 square meter greenhouse producing cut flowers was about $684,108 or $214.40 per square meter. Details on investments for cut flower greenhouses are given in Table 20.

Greenhouse Production Costs and Returns for Cut Flowers

Gross Return:

Gross return (A) from cut flowers was reported to be $428,667 per greenhouse or $143.17 per square meter. When miscellaneous receipts were added to gross return, it increased to $429,067 per average ($143.31 per square meter) greenhouse producing cut flowers. Gross return per square meter was the highest for cut flowers among all of the greenhouse crops analyzed for this report.

Variable Costs:

Variable costs (B) including unpaid labour amounted to $328,280 per average greenhouse (2 994 square meters) producing cut flowers. In terms of variable costs per square meter, these were $109.65, the highest among all of the greenhouse crops studied. Most significant cost items were growing media, seed/cuttings followed by hired labour and natural gas costs. The detailed breakdown of all variable cost items is presented in Table 21.

Capital Costs:

Capital costs (C) include cost items such as property/business taxes, equipment and building depreciation, lease payments and capital interest payment. These costs were estimated at $51,210 per average greenhouse producing cut flowers or $17.10 per square meter.

Table 20 Alberta

Average Investment for Cut Flower Producing Greenhouses, 2005

Greenhouse Area: 3,191 sq.m.

INVESTMENT SUMMARY:	Total $	$/sq. m.
Land	54,520.00	17.09
Buildings	205,000.00	64.25
Machinery & Equipment	424,588.33	133.07
TOTAL INVESTMENT	**684,108.33**	**214.40**

INVESTMENT DETAIL:	Enterprise Value ($)	Age (Years)	Depreciation ($)
Land -Building Site:	**54,520.00**		
Greenhouse Buildings:	**205,000.00**	**13.3**	**7,175.00**
Equipment:			
Refrigeration / Freezer Storage	28,166.67	12.7	1,408.33
Warehouses / Storage Sheds	68,333.33	12.5	3,416.67
Fuel Tanks	1,500.00	15.0	75.00
Houses(25%)	61,666.67	16.0	3,083.33
Other Buildings	0.00	0.0	0.00
Lighting	16,233.33	7.0	811.67
Heating System	103,666.67	9.7	5,183.33
Ventilation System	0.00	0.0	0.00
Humidity Control	10,000.00	9.3	500.00
Benches	14,000.00	13.3	700.00
Irrigation System	13,333.33	7.7	1,333.33
Water Pumps / Sand Filters	12,000.00	9.7	1,200.00
Soil Mixers / Flat Fillers /Seedling Lines	0.00	0.0	0.00
Generators	9,666.67	15.0	966.67
Roto-Tillers	12,266.67	10.0	1,226.67
Storage / Mixing Tanks	9,000.00	11.7	900.00
Sterilizers	0.00	0.0	0.00
Sprayers	1,521.67	11.7	152.17
Carts / Dolleys	666.67	10.0	66.67
Fertilizer Injectors	4,233.33	4.3	423.33
Small Tools / Hardware	13,000.00	10.8	1,300.00
Sub-Total	**379,255.00**		**22,747.17**
Machinery & Vehicles			
Bobcats / Forklifts	4,000.00	8.0	400.00
Trucks	41,333.33	9.0	4,133.33
Other Machinery	0.00	0.0	0.00
Sub-Total	**45,333.33**		**4,533.33**

Table 21 **Alberta**

Production Costs and Returns for Cut Flower Producing Greenhouses, 2005

Production Area: 2,994 sq.m.

Number of producers: 3

				Total $	$/sq. m.
(A)					
	1. Crop Sales - Imputed Value of Production			428,666.67	143.17
	2. Crop Insurance Receipts			0.00	0.00
	3. Miscellaneous Receipts			400.00	.13
	GROSS RETURN			**429,066.67**	**143.31**
(B)					
	1. Growing Media, Seed/Cuttings			55,971.00	18.69
	2. Fertilizer & Chemicals			9,616.33	3.21
	3. Greenhouse Insurance			8,110.33	2.71
	4. Trays, Boxes & Other Packaging			10,824.67	3.62
	5. Freight and /or Trucking Costs			20,148.67	6.73
	6. Auto Fuel, Repairs, Licenses & Auto Ins.			8,233.33	2.75
	7. Repairs - Buildings and Equipments			10,825.67	3.62
	8. Utilities: Natural Gas	0.00 GJ		46,234.67	15.44
	9. Electricity	0.00 KW		23,944.67	8.00
	10. Water	0.00 M^3		120.00	.04
	11. Phone			3,170.00	1.06
	12. Custom Work & Specialized Labour			182.33	.06
	13. Marketing Costs			983.33	.33
	14. Assoc. Dues, Prof'l Fees & Promotion			9,722.33	3.25
	15. Small Tools, Supplies & Misc. Expenses			6,370.00	2.13
	16. Operating Interest Paid			833.33	.28
	17. Labour Insurance / Benefits			7,703.00	2.57
	18. Hired Labour		9289.67 hours	80,460.17	26.87
	19. Unpaid Labour		3103.33 hours	24,826.67	8.29
	VARIABLE COSTS			**328,280.50**	**109.65**
(C)					
	1. Property / Business taxes			14,033.33	4.69
	2. Equipment & Building	a) Depreciation		34,455.50	11.51
		b) Lease Payments		0.00	0.00
	3. Paid Capital Interest			2,721.33	.91
	TOTAL CAPITAL COSTS			**51,210.17**	**17.10**
(D)	**CASH COSTS**	**(B+C-B19-C2a)**		**320,208.50**	**106.95**
(E)	**TOTAL PRODUCTION COSTS**	**(B+C)**		**379,490.67**	**126.75**
(F)	**GROSS MARGIN**	**(A-D)**		**108,858.17**	**36.36**
	RETURN TO UNPAID LABOUR	**(A-E+B19)**		**74,402.67**	**24.85**
	RETURN TO INVESTMENT	**(A-E+C2a)**	12.3 %	**84,031.50**	**28.07**
	RETURN TO EQUITY	**(A-E)**		**49,576.00**	**16.56**

Cash Costs:

Cash Costs (D) for the purposes of this study do not include unpaid labour and depreciation for equipment and buildings. Cash costs for cut flower production were estimated at $326,208 per average greenhouse or $106.95 per square meter. Again, these were the highest costs among all of the greenhouse crops.

Total Production Costs:

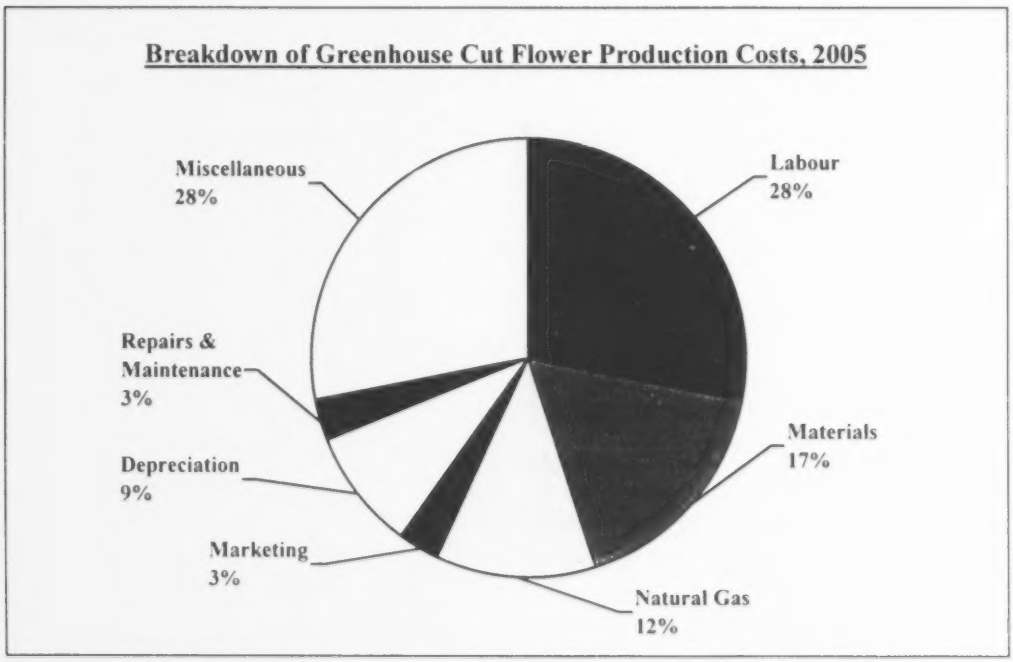
Total production costs (E), which includes all variable costs (B) and capital costs (C) were calculated to be $379,491 per average greenhouse producing cut flowers (2 994 square meter). These were $126.75 per square meter for cut flowers produced in 2005. Total production costs for cut flower production were the highest among all crops produced in greenhouses. Details on production costs are given in Table 21. Figure 9 presents the breakdown of production costs for greenhouse cut flower production.

Management Indicators:

Gross margin (F) for cut flowers production was $108,857 per greenhouse or $36.36 per square meter. On per unit basis, it was the highest among all of the crops in 2005 plants/ornamentals.

Average return to unpaid labour was estimated at $74,403 per greenhouse or $24.85 per square meter. Return to investment for cut flower production was calculated at 12.3 percent. It was $84,031 per greenhouse and $28.07 per square meter. Return to equity was also positive at $49,576 per greenhouse ($16.56 per square meter). The details on management indicators are presented in Table 21.

Figure 9



SECTION IX

Greenhouse Production Costs and Returns For Tree Seedlings

Greenhouse tree seedling production in Alberta received a big boost in the late eighties when a decision was made to encourage local production of seedlings. Prior to this, forestry tree seedlings were largely imported from British Columbia. As soon as the contracts to grow seedlings locally became available, several existing greenhouses switched to producing seedlings. At the same time quite a few new greenhouses were also built to meet the contractual demand. Presently, tree seedlings are the third largest greenhouse crop after bedding plants and cucumbers. Tree seedlings are produced in about 176 800 square meters (17.68 hectares) of greenhouse area in the province. The greenhouse area under tree seedlings is expected to increase modestly over the next several years. Survey of the greenhouse industry in 2003 revealed that there were 27 greenhouse operations engaged in tree seedling production. Average area per tree seedling producing greenhouse was estimated at 6 548 square meter in 2005.

Data on greenhouse tree seedlings investment, production costs and returns was obtained from seven greenhouse operations across the province. Greenhouse operations producing tree seedlings were significantly higher than the industry average mentioned above. Average greenhouse area for the seven participants was 11 596 square meters. It is worth noting that greenhouse tree seedlings are produced under contract by forestry companies and the provincial government.

Investment for Tree Seedling Greenhouses

The average greenhouse area for the seven tree seedling operations was estimated at 11 596 square meters, which was significantly higher than the industry average of 8 605 square meters. Land area associated with these greenhouses averages around 3 hectares valued at $126,429 per greenhouse ($10.90 per square meter).

Investment in the greenhouse buildings for tree seedling operations was calculated at $687,384 per operation or $59.28 per square meter. Average investment in machinery and equipment including vehicles amounted to $1.5 million per greenhouse ($125.33 per square meter) with an average size of 11 596 square meter. When land, buildings, machinery and equipment investments were combined, total investment was estimated at $2.27 million per operation. In terms of dollars per square meter it was $195.50. Details on land, buildings, machinery and equipment investment and depreciation amounts are presented in Table 22.

Greenhouse Production Costs and Returns for Tree Seedlings

Gross Return:

Gross return (A) represents sales of tree seedlings to the contractors at the agreed price and any income received under crop insurance, etc. Total gross return for an average greenhouse (10 779 square meter) producing tree seedlings was estimated at about $1 million or $93.49 per square meter. Details on gross return from sale of tree seedlings are presented in Table 23.

Table 22 Alberta

Average Investment for Tree Seedling Producing Greenhouses, 2005

Greenhouse Area: 11,596 sq.m.

INVESTMENT SUMMARY:	Total $	$/sq. m.
Land	126,428.57	10.90
Buildings	687,384.00	59.28
Machinery & Equipment	1,453,329.29	125.33
TOTAL INVESTMENT	**2,267,141.86**	**195.50**

INVESTMENT DETAIL:	Enterprise Value ($)	Age (Years)	Depreciation ($)
Land -Building Site:	**126,428.57**		
Greenhouse Buildings:	**687,384.00**	**11.9**	**24,058.44**
Equipment:			
Refrigeration / Freezer Storage	57,828.57	4.1	2,891.43
Warehouses / Storage Sheds	260,714.29	14.6	13,035.71
Fuel Tanks	4,542.86	9.7	227.14
Houses(25%)	23,928.57	19.6	1,196.43
Other Buildings	1,000.00	.1	50.00
Lighting	68,928.57	5.3	3,446.43
Heating System	328,571.43	9.6	16,428.57
Ventilation System	89,571.43	9.7	4,478.57
Humidity Control	51,000.00	5.3	2,550.00
Benches	151,428.57	8.9	7,571.43
Irrigation System	81,242.86	9.1	8,124.29
Water Pumps / Sand Filters	7,142.86	10.3	714.29
Soil Mixers / Flat Fillers /Seedling Lines	75,571.43	10.4	7,557.14
Generators	24,428.57	13.6	2,442.86
Roto-Tillers	571.43	1.0	57.14
Storage / Mixing Tanks	14,957.14	10.7	1,495.71
Sterilizers	5,714.29	2.1	571.43
Sprayers	1,800.00	5.7	180.00
Carts / Dolleys	66,468.57	7.7	6,646.86
Fertilizer Injectors	13,485.71	9.0	1,348.57
Small Tools / Hardware	14,571.43	8.1	1,457.14
Sub-Total	**1,343,468.57**		**82,471.14**
Machinery & Vehicles			
Bobcats / Forklifts	49,142.86	9.1	4,914.29
Trucks	60,717.86	7.3	6,071.79
Other Machinery	0.00	0.0	0.00
Sub-Total	**109,860.71**		**10,986.07**

Table 23 **Alberta**

Production Costs and Returns for Tree Seedling Producing Greenhouses, 2005

Production Area: 10,779 sq.m.

Number of producers: 7

				Total $	$/sq. m.
(A)					
	1. Crop Sales - Imputed Value of Production			1,007,733.00	93.49
	2. Crop Insurance Receipts			0.00	0.00
	3. Miscellaneous Receipts			0.00	0.00
	GROSS RETURN			**1,007,733.00**	**93.49**
(B)					
	1. Growing Media, Seed/Cuttings			32,540.71	3.02
	2. Fertilizer & Chemicals			13,085.71	1.21
	3. Greenhouse Insurance			17,095.00	1.59
	4. Trays, Boxes & Other Packaging			68,516.43	6.36
	5. Freight and /or Trucking Costs			6,315.29	.59
	6. Auto Fuel, Repairs, Licenses & Auto Ins.			10,942.14	1.02
	7. Repairs - Buildings and Equipments			29,752.00	2.76
	8. Utilities: Natural Gas	0.00 GJ		107,165.00	9.94
	9. Electricity	0.00 KW		35,705.57	3.31
	10. Water	0.00 M^3		2,645.71	.25
	11. Phone			4,021.14	.37
	12. Custom Work & Specialized Labour			3,195.71	.30
	13. Marketing Costs			47,218.57	4.38
	14. Assoc. Dues, Prof'l Fees & Promotion			14,494.43	1.34
	15. Small Tools, Supplies & Misc. Expenses			63,179.14	5.86
	16. Operating Interest Paid			6,930.29	.64
	17. Labour Insurance / Benefits			14,880.86	1.38
	18. Hired Labour	25069.43 hours		249,736.21	23.17
	19. Unpaid Labour	2267.14 hours		22,452.86	2.08
	VARIABLE COSTS			**749,872.79**	**69.57**
(C)					
	1. Property / Business taxes			7,536.29	.70
	2. Equipment & Building	a) Depreciation		117,515.65	10.90
		b) Lease Payments		0.00	0.00
	3. Paid Capital Interest			16,001.71	1.48
	TOTAL CAPITAL COSTS			**141,053.65**	**13.09**
(D)	**CASH COSTS**	**(B+C-B19-C2a)**		**750,957.93**	**69.67**
(E)	**TOTAL PRODUCTION COSTS**	**(B+C)**		**890,926.44**	**82.66**
(F)	**GROSS MARGIN**	**(A-D)**		**256,775.07**	**23.82**
	RETURN TO UNPAID LABOUR	**(A-E+B19)**		**139,259.42**	**12.92**
	RETURN TO INVESTMENT	**(A-E+C2a)**	10.3 %	**234,322.21**	**21.74**
	RETURN TO EQUITY	**(A-E)**		**116,806.56**	**10.84**

Variable Costs:

Variable costs (B), which include unpaid labour amounted to $749,873 per greenhouse for the 2005 tree seedlings production. In terms of per square meter, these costs were estimated at $69.57. The most significant cost item was the hired labour at $23.17 per square meter, almost 33 percent of all variable costs. Other significant costs were natural gas, followed by trays, boxes and other packaging, repairs to buildings and equipment and electricity. A detailed breakdown of all variable costs is presented in Table 23.

Capital Costs:

Capital costs (C) include property/business taxes, equipment and building depreciation, lease payments and paid capital interest. These costs were estimated at $141,054 per average greenhouse producing tree seedlings or $13.09 per square meter. Almost 83 percent of the capital costs were equipment and building depreciation.

Cash Costs:

Cash costs (D) consist of all out-of-pocket costs incurred during the tree seedlings production period. Cash costs were estimated at $750,958 per greenhouse or $69.67 per square meter. These costs were very close to the variable costs.

Total Production Costs:

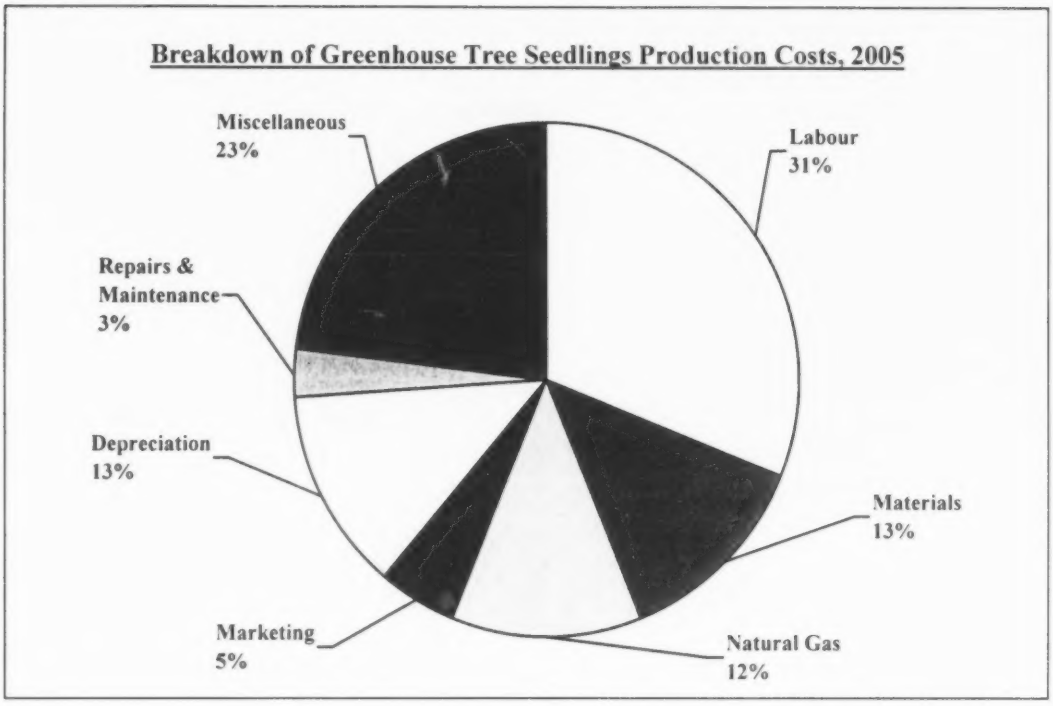
Average total production costs for tree seedling greenhouses were estimated at $890,926 or $82.86 per square meter of greenhouse production area in 2005. As mentioned above, the most significant cost items were hired labour, depreciation, natural gas and trays, boxes and other packaging. Details on various costs are presented in Table 23. Figure 10 presents the breakdown of all production costs for greenhouse tree seedling production.

Management Indicators:

Management indicators present data on gross margin (F), return to unpaid labour, return to investment and return to equity. Gross margin is based on gross return (A), less cash costs (D). For an average tree seedling producing greenhouse, gross margin was calculated at $256,775 or $23.82 per square meter. A positive gross margin shows that enterprise is profitable.

Average return to unpaid labour was positive at $139,259 per greenhouse producing tree seedlings. It was $12.92 per square meter. Return to investment was calculated at $234,322 per average greenhouse or $21.74 per square meter. In terms of percentage return to investment it was calculated at 10.3 percent. Return to equity, another management indicator was also positive at $116,807 per greenhouse or $10.84 per square meter. Details on management indicators are presented in Table 23.

Figure 10


Breakdown of Greenhouse Tree Seedlings Production Costs, 2005
Miscellaneous 23%
Labour 31%
Repairs & Maintenance 3%
Depreciation 13%
Materials 13%
Marketing 5%
Natural Gas 12%

SECTION X

SUMMARY

Summary of Costs and Returns

This section provides a summary of 2005 costs and returns data for the various greenhouse crops produces across the province. Data on the major greenhouse crops was obtained from forty-two greenhouse operations scattered throughout Alberta. Distribution of the study sample by crops was as follows:

Greenhouse Crop	Number of Participants
Cucumber	10
Tomatoes	11
Peppers	6
Bedding Plants/Ornamentals	6
Cut Flower	3
Tree Seedlings	7
Total	**43**

Investment and investment costs were computed from the data provided by study participants by crops. Total investment per greenhouse and cost per square meter are presented in Table 24 by various crops. Average investment cost per square meter ranged from $100.42 for cucumbers in Medicine Hat/Redcliff area to $214.40 for cut flowers producing greenhouses.

Gross return per square meter was the highest for cut flower production at $143.31. Gross return for cucumbers in Medicine Hat/Redcliff area was $88.21 per square meter compared to $90.72 in north-central Alberta. Gross return for tomatoes was $90.80 and $97.84 per square meter for Medicine Hat/Redcliff and north-central Alberta respectively. For greenhouse peppers, gross return was $94.30 per square meter in north-central area. Gross return for bedding plants and ornamentals was estimated at $135.39 per square meter - second highest after cut flowers. Gross return for tree seedlings production was $93.49 per square meter in 2005.

Average production costs for the 2005 crop year, summarized by types of crops produced in greenhouses in Alberta, are presented in Table 24. Major production costs varied by type of crops produced in the greenhouses. However, these can be categorized as labour (hired and operator), material inputs, marketing costs and natural gas. Total production costs ranged from a low of $82.66 per square meter for tree seedlings to a high of $126.75 per square meter for cut flower greenhouses.

Greenhouses producing bedding plants/ornamentals showed the highest gross margin per square meter at $36.61 followed by cut flowers at $36.36, tree seedlings at $23.82, peppers at $11.05, tomatoes at $3.21 and $9.24 and cucumbers at $7.20 and $0.38 per square meter. Average return to equity was negative at $10.75 for cucumbers in north-central areas. Return to equity for other greenhouse crops (bedding plants/ornamentals, cut flowers and tree seedlings) were positive. Details on costs and returns are presented in Table 24.

Table 24

SUMMARY OF GREENHOUSE PRODUCTION COSTS AND RETURNS BY CROPS, 2005								
	Cucumbers		**Tomatoes**		**Peppers**	**Bedding Plants/ Ornamentals**	**Cut Flowers**	**Tree Seedlings**
	Med. Hat & Redcliff	North-Central	Med. Hat & Redcliff	North-Central	North-Central			
Number Survey	6	4	6	5	4	6	3	7
Average Production Area (sq. meter)	6 753	4 480	5 603	4 262	7 305	1 671	2 994	10 779
----------dollars per square meter----------								
Average Investment	100.42	170.74	139.80	178.94	201.07	174.57	214.40	195.50
Gross Return	**88.21**	**90.72**	**90.80**	**97.84**	**94.30**	**135.39**	**143.31**	**93.49**
Material Inputs	14.95	11.98	11.24	11.47	11.74	27.04	25.52	10.59
Natural Gas	16.07	18.31	15.89	18.71	19.57	13.94	15.44	9.94
Hired Labour	16.59	20.10	21.80	24.98	18.09	28.19	26.87	23.17
Marketing Costs	15.24	15.26	19.56	11.76	14.41	1.68	0.33	4.38
Other Cash Costs	11.98	6.56	15.57	13.49	13.48	24.31	33.20	19.41
Operator Labour	0.77	1.90	0.15	1.24	2.22	8.34	8.29	2.08
Capital Costs	10.94	13.68	10.68	17.62	16.01	13.66	17.10	13.09
Total Production Costs	**86.54**	**87.79**	**94.89**	**99.27**	**95.52**	**117.16**	**126.75**	**82.66**
Gross Margin	7.20	0.38	3.21	9.24	11.05	36.61	36.36	23.82
Return to Investment	6.43	(1.52)	3.06	8.00	8.83	28.26	28.07	21.74
Return to Equity	1.67	(10.75)	(4.09)	(1.43)	(1.23)	18.23	16.56	10.84

Appendix

SUMMARY OF GREENHOUSE PRODUCTION COSTS AND RETURNS BY CROPS, 2000						
	Cucumbers	**Tomatoes**	**Peppers**	**Bedding Plants/ Ornamentals**	**Cut Flowers**	**Tree Seedlings**
Number Survey	10	7	5	7	6	7
Average Production Area, (square meter)	4 958	3 272	3 435	2 443	2 176	10 396
----------dollars per square meter----------						
Average Investment	135.15	152.25	156.67	112.66	205.20	165.70
Gross Revenue	**64.67**	**82.85**	**93.07**	**84.90**	**136.54**	**83.17**
Material Inputs	9.15	11.84	12.48	14.96	31.63	10.33
Natural Gas	10.44	17.22	11.73	7.42	11.62	8.82
Hired Labour	8.72	14.20	9.90	13.67	26.68	33.14
Marketing Costs	10.65	11.51	11.62	2.80	2.69	4.30
Other Cash Costs	11.51	12.37	10.01	8.29	31.10	13.77
Operator Labour	4.95	3.66	6.67	16.46	5.38	1.29
Capital Costs	13.56	15.38	15.60	9.58	13.34	10.76
Total Production Costs	**68.97**	**86.19**	**78.01**	**73.17**	**122.45**	**82.42**
Gross Margin	7.32	8.07	30.56	34.65	30.99	11.51
Return to Investment	2.37	4.41	23.89	18.08	25.61	10.22
Return to Equity	(4.41)	(3.34)	15.16	11.62	14.20	0.75